


# DYES CLASSIFIED BY INTERMEDIATES

Dyes tabularly arranged under each intermediate, with statistical and other data for both dyes and intermediates. Glossary of Dye and Intermediate names alphabetically arranged.

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## PREFACE

Experience in the manufacture of dyes indicates that the proper viewpoint for a correct technical program is from the intermediate side. This is a direct corollary of the fact that the intermediates are the materials out of which dyes are fabricated. Furthermore, the tremendous complexity of the dye industry, the interrelationship of one dye to another or of one intermediate to another, as well as the relationship of dyes and intermediates to the whole organic chemical industry, all require that there be available tables showing the commercial dyes derived from each important intermediate. To give this is the prime object of this work.

It is believed that this book will be of service not only to manufacturers in looking for uses of any intermediate, but to research chemists and to students. Since the tables give the various outlets and the poundage imported and manufactured, the book will aid the merchant in the buying or selling of dyes and intermediates. The very complete glossary of names, both of dyes and intermediates, will help in many directions, especially as the intermediate part includes the so-called common or trivial names. This feature will be of great service in reading the older literature and patents.

The intermediate names are alphabetically arranged. Under each principal name is given the synonyms, which are also cross-indexed in their alphabetical order. A special feature is the giving of the name used by Chemical Abstracts; this, together with the listing of the principal formulas, will aid in the use of the Chemical Abstracts by the Dye Chemist.

A Formula Index to the names of the intermediates and to the pages is given following the main part of this book containing the alphabetical treatment of the intermediates. Here the formulas of the intermediates are listed in an alphabetical order as in a dictionary, except that CH comes first; and in this way a 5-atom formula may precede a 3-atom one. This is similar to the excellent formula index of the 1920 Chemical Abstracts.

After the writer had been engaged for some time in the preparation of this book, he was informed of a somewhat similar classification undertaken by Messrs. Warren N. Watson and A. R. Willis of the Tariff Commission, Washington, D.C. It was deemed fair to coöper-

## PREFACE

ate and to associate the two works by the mutual use of the other names as "collaborators." Messrs. Watson and Willis have published a part of their work, comprising about a third of the Schultz dyes, in the *Color Trade Journal* serially from May to September during 1921. This serial publication by Messrs. Watson and Willis and this book by the writer are separate and independent productions. The writer, however, takes this occasion to express his appreciation for advice and help to Messrs. Watson and Willis.

It is a pleasure to acknowledge help from Dr. Austin M. Patterson on the Chemical Abstracts nomenclature. Aid has also been rendered by J. R. Minevitch, M. N. Conklin and Oscar Newman. The statistical data are taken from the yearly *Census of Dyes and Coal Tar Chemicals* compiled by the U. S. Tariff Commission, and from *Artificial Dyestuffs Used in the United States* by Thomas H. Norton.

R. NORRIS SHREVE.

NEW YORK CITY  
December, 1921.

## ABBREVIATIONS

### Dye Application Column

A . . . . .	Acid dye
ACr . . . . .	Acid chrome dye
B . . . . .	Basic dye
CL . . . . .	Color lake
D . . . . .	Direct dye
MF . . . . .	Color made on fiber
M . . . . .	Mordant dye
S . . . . .	Sulfur dye
ss . . . . .	Spirit soluble dye
V . . . . .	Vat dye

### Statistics Column

I '14 . . . . .	Imports, Fiscal Year 1914 (year ending June 30, 1914)
I '20 . . . . .	Imports, Calendar Year 1920
M'17 . . . . .	} Manufactured in Calendar Year 1917, 1918, 1919, or 1920
M'18 . . . . .	
M'19 . . . . .	
M'20 . . . . .	

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## THORPE, DIC. CHEMISTRY

Edw. Thorpe, A Dictionary of Applied Chemistry, First Edition, Longmans Green & Co.

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Enzyklopaedie der technischen Chemie, Edited by Dr. Fritz Ullmann, 1914. Urban & Schwarzenberg.

## Miscellaneous

<i>o</i> . . . . .	ortho
<i>m</i> . . . . .	meta
<i>p</i> . . . . .	para
<i>α</i> . . . . .	alpha
<i>β</i> . . . . .	beta
<i>N</i> . . . . .	Nitrogen ( <i>signifies nitrogen attachment of radical</i> )
<i>C. A. nomen.</i> . .	Chemical Abstracts nomenclature
(mols) . . . . .	Molecules
Schultz Number .	Number for dye as given in Schultz, Farbstofftabellen, 1914 Edition.

## INTRODUCTION

The contents of this book fall into two parts: first, an alphabetical list of intermediates with their data and dye tables, and second, an alphabetical list of dye names referring to their Schultz numbers when known, by which any dye here classified can be found in the tables by looking in the "Page Index of Schultz Numbers" at the end of the book for the appropriate pages.

Often an intermediate is known by as many as half a dozen names, and each one is listed in its alphabetical order, but the synonyms all refer to one name under which are arranged the tables and other data. Thus the book is a glossary of intermediate names. In selecting the name given at the head of the data for a certain intermediate, the writer was influenced first by considerations of clearness and then of custom and usage. For a full discussion of this important nomenclature question, reference is made to the nomenclature section of this introduction.

Following the synonyms, is given the structural formula, the empirical formula, and the molecular weight. It is the emphatic opinion of the writer that the indexing of organic compounds by their formulas is the simplest, the most universal, and the clearest. Chemical Abstracts, starting with 1920, has inserted a formula index, and it is believed that chemists can find a given intermediate quicker and more surely in Chemical Abstracts by the use of this formula index than by the ordinary subject index. The formulas given here will be an aid in this direction. Furthermore a formula index is included in this book.

Under each intermediate there is listed a short description of methods of *Formation* followed by *Literature References*. These are not exhaustive in any sense, but the aim has been to give the usual commercial preparation together with several references to the literature for any one who desires more details. The references to Lange, Zwischenprodukte, cover the German patents.

In order to give some basis for judging the extent to which a dye or an intermediate is used, the statistical data for importation and manufacture in the United States is given under *Statistics*. These data are taken from the following government reports: *Census of Dyes and Coal-Tar Chemicals*, by U. S. Tariff Commission; *Artificial Dyestuffs Used in the U. S.*, by Thomas H. Norton, and *Chemicals and Allied Products*

*Used in the U. S.* by E. R. Pickrell. The *Imports 1914* both under intermediates and under dyes refer to the imports for the fiscal year ending June 30, 1914. Otherwise the imports, and always the amounts manufactured, refer to the calendar year marked. It is believed that the addition of these statistical data to the tables will be of much service in pointing out forcibly the relative commercial importance of the dyes and intermediates, and will help to complete development of the dye industry in America. In considering these statistics, it must be borne in mind that since 1914 the United States has been endeavoring to fully supply her own needs, and proceeded naturally along the lines of least resistance, so that often a dye was manufactured because of its comparative simplicity, to be later superseded by a more suitable dye of more complexity. The Imports for 1914 (fiscal year ending June 30, 1914) are "normal" except that Vat Dyes were not imported as heavily that year as had been the usual case.

The statistics of import of a dye, especially for the fiscal year ending June 30, 1914, often include a number of very similar though not identical dyes. These statistics were obtained by adding together the individual dye weights as listed by Norton under a given Schultz number.

Where *I'14*, *M'19*, *Manufactured 1919*, etc., are given followed by a question mark, it indicates that the dye or intermediate was imported or manufactured for the year marked but in amounts that have not been disclosed by the U. S. Government.

When a figure is given for imports or manufactures of dyes or intermediates, this figure always refers to pounds.

The tables proper give for any intermediate all the dyes listed in Schultz, *Farbstofftabellen*, 1914 Edition, that are derived from this intermediate. This includes practically all of the important dyes except a few of the newer ones of undisclosed constitution. Thus a given dye is separately arranged under each of its intermediates. As there is named in a special column the *Other Intermediates* constituting a dye besides the one at the head of each table, the intermediate relationship is clearly stated.

The following dyes listed in Schultz, *Farbstofftabellen* (1914), are not classified, on account of lack of information as to their composition.

30	Radial Yellow G	706	Cachou de Laval
87	Peri Wool Blue	707	Sulfine Brown
608	Euchrysine	708	Sulfaniline Brown
609	Homophosphine G	744	Sulfo Black B, 2B

751 Kryogene Brown RB	756 Kryogene Black TGO
752 Kryogene Direct Blue GO	757 Sulfogene Brown G, D
753 Kryogene Direct Blue B	863 Anthraquinone Blue Green BXO
754 Kryogene Direct Blue 3B	871 Indanthrene Violet RN Extra
755 Kryogene Black BNX	

In very many cases, the writer has supplemented the information in Schultz, *Farbstofftabellen*, as to composition of dyes, and hence has been able to classify many dyes whose composition is indefinite in this book. In a number of instances when Schultz refers the dyes to complex intermediates, these have been split into simpler components, and the components as well as the complex parent compound have all been indexed. Also certain obvious errors in Schultz, *Farbstofftabellen*, have been corrected, as for example, where in #182, reference is made to 1-amino-4-naphthol-sulfonic acids which the patent refers to  $\alpha_1:\alpha_4$ -sulfonic acids (1-amino-8-naphthol-sulfonic acids) and specifically names H acid in the example given.

When the patents describing a dye list a number of intermediates, then those listed under Example I of the patent are chosen for classification unless, of course, Schultz, *Farbstofftabellen*, gives definite composition to the dye. Quite often intermediates are indexed even though not a component part of the final dye, provided they were necessary to its manufacture, e.g. benzoic acid in the manufacture of certain of the Triphenyl-methane Dyes as Diphenylamine Blue and Aniline Blue.

All possible intermediates for any given dye are not indexed, but it is hoped to extend the present classification at a later date. Previous tables resembling those given here, but along much less extensive lines, are to be found in Heumann, *Die Anilinfarben und ihre Fabrikation* IV, II, 2, pages 1943-2013, and Lefevre, *Traité des Matières Colorantes* (1896), pages 140-407.

In the column in the tables headed *Other Intermediates Used and Notes*, there is given first the intermediates other than the one at the head of the table, which compose the dye in question. Unless otherwise marked, it is to be understood that one molecule of an intermediate is used. When more than one molecule is employed, of the intermediate heading the table, then the name of this intermediate is also given in the *Other Intermediates* column followed by the number of molecules (mols) that are used in the dye.

The notes are in brackets, and are mostly self-explanatory, and refer chiefly to constituents, such as sulfur (S), sodium sulfide ( $\text{Na}_2\text{S}$ ), and the like, which enter into the formation of the dye. Such steps as



Sulfonation, Bromination, and Chlorination are given, but Coupling by Diazotization and Condensation are to be understood.

Under notes is generally listed the name of a given dye if it is a step in the preparation of the dye classified in the table, but this component dye is not used as the index or heading for any of the dye classification tables, and this fact is indicated by placing the name of the component dye in a bracket.

Indigo is an exception, and the dyes based on it are tabulated thereunder as well as under the various component intermediates.

The last column in the tables classifies the dyes by their usual method of application as indicated by the following abbreviations.

A	. . . . .	Acid dye
ACr	. . . . .	Acid chrome dye
B	. . . . .	Basic dye
CL	. . . . .	Color lake
D	. . . . .	Direct dye
MF	. . . . .	Color made on fiber
M	. . . . .	Mordant dye
S	. . . . .	Sulfur dye
ss	. . . . .	Spirit soluble dye
V	. . . . .	Vat dye

A classification of this kind is not very exact in certain cases where a dye is susceptible of several different methods of application. The aim has been to give the mode of application most generally employed.

Regarding the naming of the dyes, there is used in the tables that name first given in Schultz, *Farbstofftabellen* (1914), followed by a second name in those cases where the second name is more generally used in the United States than the first Schultz name.

A glossary of the ordinary German and Swiss names, together with many of the American and English names, is given in the back of the book. It would have been very helpful to have added to this list all the current American and English marks, but in the present development stage of the American dye industry, this turned out to be impractical. The list as given includes those listed and classified by Norton in *Artificial Dyestuffs Used in U. S.*, with various corrections and a considerable number of additions. These names refer to "Schultz" numbers where known, and as the last few pages of the book give a list of the pages on which occur references to any "Schultz" number, the place of any dye of known constitution can be readily found, together with the data regarding that dye.

In the tables, the dyes are classified under the usual constitutional headings, which are here grouped in the following list:

Nitroso Dyes  
Nitro Dyes  
Stilbene Dyes  
Pyrazolone Dyes  
Monoazo Dyes  
Disazo Dyes  
Trisazo Dyes  
Tetrakisazo Dyes  
Auramines  
Triphenyl-methane Dyes  
Diphenyl-naphthyl-methane Dyes  
Xanthone Dyes  
Acridine Dyes  
Quinoline Dyes  
Thiobenzoyl Dyes  
Indophenol  
Oxazine Dyes  
Thiazine Dyes  
Azine Dyes  
Sulfur Dyes  
Anthraquinone and Allied Dyes  
Indigo Group Dyes  
Aniline Black Group

## NOMENCLATURE

The scientific naming of intermediates has indeed been confused, and in many instances a number of names have been used for the same compound, or the same name for several different compounds. It has been the aim of this book to give the various names met with in the literature for the intermediates, and to cross-index these names in the alphabetical arrangement,—thus giving a glossary of intermediate names for all those common intermediates here considered. Furthermore the common or trivial names are listed in a very complete manner and include the trivial names for many intermediates not specially considered here. As mentioned before, there has been chosen for the principal name from among the various synonyms that name which is clear and which is sanctioned by custom. In so choosing, the tendency has been to adopt a few of the well-known trivial or common names,

such as H Acid and Nevile-Winther's Acid, in place of the strictly chemical names; for the writer's experience is that dye men, whether in the research laboratory, the factory, or the office, speak of H Acid for example, and not 1-amino-8-naphthol-3: 6-disulfonic acid.

The most scientific nomenclature is that used by Chemical Abstracts of the American Chemical Society. This is fully explained in the Introduction to Decennial Index of Chemical Abstracts, as well as in the Journal of the American Chemical Society.<sup>1</sup>

It, however, offers the disadvantage of requiring considerable study to master its principles, which often vary from the practice of the dye industry, and furthermore there is comparatively little literature pertaining to dyes and intermediates in the years covered by Chemical Abstracts.

On the other hand, organic chemistry is now so complex that more attention must be paid to scientific naming of organic compounds, and also the amount of dye literature contained in Chemical Abstracts is increasing yearly, so that it is to the advantage of the dye chemist to familiarize himself with the procedure of Chemical Abstracts, and it cannot be too strongly recommended that every one make a study of the principles of Chemical Abstracts nomenclature as disclosed in the references given above.

This book aims to give the Chemical Abstracts name for each intermediate; and in the many cases where this name differs from the one in common use, this Chemical Abstracts name is so designated by being marked *C. A. nomen.*, as an abbreviation for Chemical Abstracts Nomenclature. If only one name is listed, it is to be understood that this is the one sanctioned by Chemical Abstracts.

Beginning with the 1920 volumes of Chemical Abstracts, a Formula Index is included, which offers the easiest way to find reference to a chemical compound or its nomenclature.

In case of many benzene derivatives, the writer has adopted the Chemical Abstracts nomenclature, as there is considerable confusion in the literature regarding these names, and as the Chemical Abstracts procedure does not vary greatly as a rule from well-recognized practice. However, in case of many of the naphthalene derivatives the Chemical Abstracts practice is so far from what is commonly used that the Chemical Abstracts names are only given as synonyms. The men responsible for Chemical Abstracts are showing a great willingness to bring their

<sup>1</sup> Patterson and Curran, J. Amer. Chem. Soc. **39**, 1623-38 (1917).

system as near to that used in practice as possible, and in all probability the near future will show closer accord.

The very common use of more than one of the terms *ortho*, *meta*, and *para*, to indicate position of substituents, is very confusing and should be dropped in preference either to the procedure of Chemical Abstracts where one such term is used in connection with numbers, or to the use of numbers alone. For example, *m*-nitro-*p*-toluidine ( $\text{CH}_3 = 1$ ) and *o*-amino-phenol-*p*-sulfonic acid should be replaced by 2-nitro-*p*-toluidine ( $\text{NH}_2 = 1$ ) and 2-amino-1-phenol-4-sulfonic acid, the present Chemical Abstracts usage. In the former case the writer much prefers the name 1-amino-2-nitro-4-toluene.

Chemical Abstracts uses *p*-toluidine ( $\text{NH}_2 = 1$ ) and *p*-phenylene-diamine and the like as "index compounds" with the various substituents as modifiers, arranged in an inverted order in their indices. In this book the practice of Chemical Abstracts in this regard is followed, except for the inversion for the principal name of the intermediate. The other names are given as synonyms and cross-indexed. However, in the body of the tables, such terms as *o*-amino-phenol-*p*-sulfonic acid are used in a few cases because of their very common usage, and consequent quick recognition.

Treating the matter broadly, the gist of the Chemical Abstracts nomenclature practice is that the "chief function" of a compound is expressed in the main part of the name, which with "its functional ending, if any, is placed first in the index, the names of the substituents following." The numbering starts from the "chief function" and is not varied by the addition of substituents, for instance,—2: 7-naphthalene-sulfonic acid is an "index compound," as is likewise 1 naphthalene-sulfonic acid; and their amino, halogen, and nitro derivatives are indexed thereunder. For instance, Laurent's Acid or what is ordinarily called 1-naphthylamine-5-sulfonic acid is indexed by Chemical Abstracts under 1-naphthalene-sulfonic acid, and called 5-amino-1-naphthalene-sulfonic acid. In the decennial index, hydroxy was also considered as a substituent.

However, naphthol-sulfonic acids and phenol-sulfonic acids are now recognized by Chemical Abstracts as exceptions to their rule of assigning the chief function to acids, and of allowing only one functional ending in the index name. So that while in the decennial index these -ol-sulfonic acids had their numbering start with the sulfonic group, now the numbering begins with the hydroxyl. For example, 1-naphthol-4-sulfonic acid and 1-naphthol-3: 6-disulfonic acid. In case of amino- nitro-

*chloro-* derivatives and the like, the positions are referred to the set numbering of the index compound. Take H Acid,—this is viewed as a derivative of index compound *1-naphthol-3: 6-disulfonic acid* by Chemical Abstracts, and is named in their index as *8-amino-1-naphthol-3: 6-disulfonic acid*, or in their inverted form as *1-naphthol-3: 6-disulfonic acid, 8-amino-*.

This numbering is quite different from the ordinary numbering of *1-amino-8-naphthol-3: 6-disulfonic acid* for H Acid. The giving in this book of both nomenclatures will help in the using of Chemical Abstracts, and as a further aid in this direction the first letter of the index compound as employed in Chemical Abstracts is italicized.

The rule of Chemical Abstracts regarding arrangement of substituents, reads as follows:—"The names of substituent radicals in the name of a compound are arranged in alphabetical order." This is an excellent practice and should be universally adopted. In conformance with this, benzyl-ethyl-aniline is recommended, and not ethyl-benzyl-aniline.

In the naming of toluene derivatives, the usual custom has been to start numbering from the CH<sub>3</sub> group irrespective of other substituents. In Chemical Abstracts, the numbering starts from the chief function, and the order of the chief function is: "*onium compounds, acid* (carboxylic first), *acid halide, amide, imide, aldehyde, nitrile, ketone, alcohol, phenol, mercaptan, amine, imine, ether, sulfide* (and *sulfoxide* and *sulfone*)." So whenever sulfonic acid is present, the start of the numbering is with this group, except that the carboxylic group, being an acid radical, is of same order as sulfonic, and has been given precedence over the sulfonic radical. Instead of *toluidine-sulfonic acid* with the numbering based on the CH<sub>3</sub>, Chemical Abstracts uses *amino-o-* (or *m-* or *p-*) *toluene-sulfonic acid* and starts the numbering with the sulfonic acid group. *Toluidines* start their numbering from the NH<sub>2</sub> group, as it has precedence over CH<sub>3</sub>. Another divergence of the Chemical Abstracts practice from the ordinary numbering is the place of the numbers or letters in such terms as the following:

Ordinary Practice	Chemical Abstracts Practice
Naphthalene-2: 7-disulfonic Acid	2: 7-Naphthalenedisulfonic Acid
Toluene- <i>p</i> -sulfonic Acid	<i>p</i> -Toluenesulfonic Acid

The custom of using hyphens to set off radicals and substituents from each other and from the parent compound is extensively used in this book for the sake of clearness, and as an aid to the eye and the mind. No one thinks of a complex organic chemical as a whole, but as a com-

plex of various substituents around a central body; therefore the writing of a long name like tetramethyldiaminodiphenylmethane as one word is very reprehensible and should be early abandoned. Otherwise the careless practice of writing as two or more separate words the name of one chemical individual is bound to increase; already this latter practice is gaining too much headway, as can be seen by an inspection of our trade or semi-technical journals.

The rule about hyphens as used here is to insert them between all radicals, and between the radicals and the parent body, except in the case of compound radicals, such as *methylamino-* ( $\text{CH}_3\text{NH-}$ ), *tetraethyl-*, *disulfonic-* and the like. *Methylamino* should not be written *methyl-amino*. While Chemical Abstracts does not employ hyphens in this broad way, yet the use of hyphens has been extended to the names otherwise following Chemical Abstracts procedure.

It is clearly recognized that the nomenclature here used is not always consistent as between the scientific and common usage. For example while *2-amino-1-phenol-4-sulfonic acid* is listed as the principal name of this intermediate, yet in the body of the tables the ordinarily used synonym *o-amino-phenol-p-sulfonic acid* is given because of its quick recognition. However, the movement to a more scientific nomenclature such as used by Chemical Abstracts should be encouraged as much as possible, and such terms as *o-amino-phenol-p-sulfonic acid* should be dropped gradually.

PART I  
INTERMEDIATES

## KEY TO PART I INTERMEDIATES AND DYE TABLES

The arrangement is alphabetical not only by chemical but by trivial or common names. Many trivial names are listed for intermediates which are not further considered. Dye tables and other data accompany those intermediates which enter directly into the formation of the commonly used dyes.

Synonyms and trivial names are given for the intermediates, and these synonyms and trivial names are listed not only under the appropriate intermediate but also separately in the alphabetical arrangement.

That chemical name called for by the Chemical Abstracts nomenclature is to be found either as the principal name of each intermediate or among its synonyms. This is distinguished by being followed by the abbreviation *C. A. nomen.*, except when only one name is used for an intermediate, in which case this name is the one in common usage and is also that one sanctioned by Chemical Abstracts. In the indices of Chemical Abstracts the names are alphabetically arranged under a number of "parent compounds" which in ordinary usage are preceded by the modifying radicals. As this book follows the ordinary usage, it was thought that it would be helpful to designate the Chemical Abstracts "parent compound," which is done by italicizing the first letter of these "parent compounds" in those names following Chemical Abstracts nomenclature.

The prefixes *m*-, *o*-, *p*-, *α*-, *β*- and the like are not considered in the main alphabetical arrangement. Hence *β*-naphthol (beta-naphthol) is to be found under *N*.

The import statistics are not for each strictly individual dye mark, but represent a group identical to or closely resembling a given Schultz dye. These figures are arrived at by adding the total poundage of these dyes arranged by Norton under each Schultz number in his book, *Artificial Dyestuffs Used in U. S.*

Unless otherwise marked, it is to be understood that only one molecule of each intermediate is a part of a dye. Furthermore, when more than one molecule is employed of the intermediate heading a dye table, the name of this intermediate is entered under the *Other Intermediates* column followed by the number of molecules involved.

A fuller consideration of these principles is to be found in the Introduction. See also abbreviations on page 5.



## INTERMEDIATES

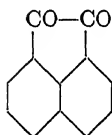
The intermediates are arranged alphabetically by their chemical names and by their trivial or common names, and they are accompanied by the dye tables and other data. See Introduction, or page 18, for explanation of this arrangement.

### A Acid

1: 7-Dihydroxy-naphthalene-3:6-disulfonic Acid (*not considered herein*)

### Acenaphthenequinone (*C. A. nomen.*)

7: 8-Diketo-acenaphthene



$$= \text{C}_{12}\text{H}_6\text{O}_2 = 182$$

FORMATION.—From acenaphthene by oxidation

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 242

### Dyes Derived from Acenaphthenequinone

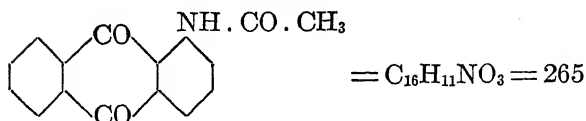
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
907	INDIGO GROUP DYES Ciba Scarlet G	I '14:—22,265 I '20:—25,578	2-Hydroxy-thio- naphthene	V
908	Ciba Red R	I '14:— 1,001	2-Hydroxy-thionaph- thene [Bromination]	V
911	Ciba Orange G	I '14:— 222	5-Amino-2-hydroxy- thionaphthene	V

### 3-Acenaphthenol (*C. A. nomen.*)

*See*, 3-Hydroxy-acenaphthene

### 8-Acetamido - 5 - amino - 2' - naphthalene' -sulfonic Acid (C. A. *nomen.*)

*See*, Acetyl-1:4-naphthylene-diamine-6-sulfonic Acid

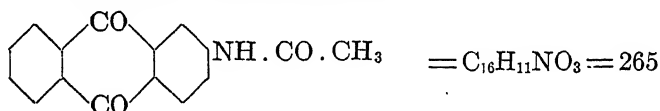
**1-Acetamido-anthraquinone**

FORMATION.—From 1-amino-anthraquinone by action of acetic anhydride on solution in oleum

LITERATURE.—Lange, Zwischenprodukte, #3124

**Dyes Derived from 1-Acetamido-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
813	ANTHRAQUINONE AND ALLIED DYES Indanthrene Copper R	I '14:—1,268	1:6- (or 1:7-) Diacetamido-anthraquinone	V

**2-Acetamido-anthraquinone**

FORMATION.—From 2-amino-anthraquinone by action of acetic anhydride on oleum solution

LITERATURE.—Lange, Zwischenprodukte, #3124

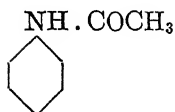
**Dyes Derived from 2-Acetamido-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
812	ANTHRAQUINONE AND ALLIED DYES Indanthrene Orange R T	I '14:—2,103 I '20:— 381	1:6- (or 1:7-) Diacetamido-anthraquinone	V

**8-Acetamido-1-naphthol-3:6-disulfonic Acid**

See, Acetyl-H Acid

**Acetanilide**



STATISTICS.—Manufactured 1917:—1,897,703 lbs.

Manufactured 1918:—2,085,088 lbs.

Manufactured 1919:—1,934,125 lbs.

Manufactured 1920:—2,667,252 lbs.

FORMATION.—By heating aniline with glacial acetic acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 52  
Lange, *Zwischenprodukte*, #117

USES.—For preparation of *p*-nitro-acetanilide, and for *p*-nitro-aniline

**Aceto-acetic Ethyl Ester**



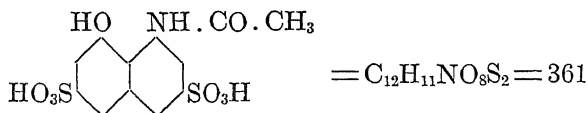
FORMATION.—By the reaction of dry sodium ethylate and dry ethyl acetate

**Dyes Derived from Aceto-acetic Ethyl Ester**

<i>Schult: Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
19	PYRAZOLONE DYES Flavazine L Fast Light Yellow	I '14:—38,908 I '20:— 9,327	Aniline Phenyl-hydrazine- <i>p</i> -sulfonic Acid	A
22	Xylene Yellow 3 G	I '14:—23,074 I '20:—77,782	2: 5-Dichloro-phenyl-hydrazine-4-sulfonic Acid	A
25	Dianil Yellow 3 G		Primuline-sulfonic Acid	D
27	Dianil Yellow 2 R		Primuline-sulfonic Acid Phenyl-hydrazine- <i>p</i> -sulfonic Acid	D
773	ANTHRAQUINONE AND ALLIED DYES Anthracene Yellow	I '14:— 4,046	Pyrogallol	M

**N-Acetyl-1-amino-8-naphthol-3: 6-disulfonic Acid**

See, Acetyl-H Acid

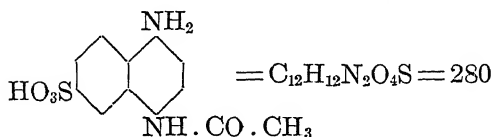
**Acetyl-H Acid***N*-Acetyl-1-amino-8-naphthol-3:6-disulfonic Acid8-Acetamido-1-naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '20:—?

FORMATION.—From H acid by acetylation

**Dyes Derived from Acetyl-H Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Applica- tion Class</i>
42	MONOAZO DYES Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? M '20:—132,637 I '20:— 2,028	Aniline	A
66	Amido Naphthol Red 6 B	I '14:— 45,697 M '18:— ? M '19:— ? M '20:—142,567 I '20:— 1,299	<i>p</i> -Amino-acetanilide	A

**Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid**8-Acetamido-5-amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—From mixture of 1-naphthylamine-6-and-7-sulfonic acid (Cleve's Acids) by acetylation with glacial acetic acid, nitration with mixed acid, and reduction with iron.

LITERATURE.—Georgievics and Grandmougin, *Dye Chemistry*, 152

**Dyes Derived from Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
273	DISAZO DYES Diaminogen Blue BB	I '14:— 8,308 M '17:— ?	$\alpha$ -Naphthylamine Schaeffer's Acid	D
274	Diaminogen B	I '20:— 5,936 I '14:—313,629 I '20:— 18,120	[Saponification] $\alpha$ -Naphthylamine Gamma Acid [Saponification]	D

**Acetyl-*p*-phenylenediamine**

*See, p-Amino-acetanilide (C. A. nomen.)*

***o*-Acid (of Claus and Voltz)**

*See, Croceine Acid*

**1: 2: 4 Acid**

*See, 1-Amino-2-naphthol-4-sulfonic Acid*

**$\beta$  Acid or Beta Acid**

*See, Anthraquinone-2-sulfonic Acid*

**$\delta$  Acid or Delta Acid**

*See, 1-Naphthylamine-4: 8-disulfonic Acid and 2-Naphthylamine-7-sulfonic Acid*

**$\epsilon$  Acid or Epsilon Acid**

*See, 1-Naphthol-3: 8-disulfonic Acid*

*See, 1-Naphthylamine-3: 8-disulfonic Acid*

*and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (not considered herein)*

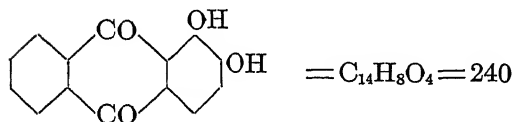
**$\zeta$  Acid or Zeta Acid**

*Naphthasultone-3-sulfonic Acid (not considered herein)*

**λ Acid or Lambda Acid***See*, 1-Naphthylamine-2-sulfonic Acid**μ Acid or Mu Acid***See*, 1-Naphthylamine-6-sulfonic Acid**ρ Acid or Rho Acid***See*, Anthraquinone-1:5-disulfonic Acid**χ Acid or Chi Acid***See*, Anthraquinone-1:8-disulfonic Acid**Alén's α or Alén's Alpha Acid.** (*This is generally followed by the class of the compound, e.g., Alén's α Naphthylamine-disulfonic Acid*)*See*, Freund's Acid (1-Naphthylamine-3:6-disulfonic Acid)1-Nitro-naphthalene-3:6-disulfonic Acid (*not considered herein*)**Alén's β or Alén's Beta Acid.** (*Generally followed by the class of the compound, e.g., Alén's β Naphthylamine-disulfonic Acid*)1-Naphthylamine-3:7-disulfonic Acid (*not considered herein*)1-Nitro-naphthalene-3:7-disulfonic Acid (*not considered herein*)**Alizarin**

1:2-Dihydroxy-anthraquinone

α : β-Dihydroxy-anthraquinone

STATISTICS.—*See* #778 in following table

FORMATION.—From sodium 2-anthraquinone-sulfonate by fusion with caustic soda for 2-3 days at 200° C., in autoclave, and in presence of potassium chlorate

LITERATURE.—Schultz, Farbstofftabellen (1914 Ed.), #778

Dyes Derived from Alizarin

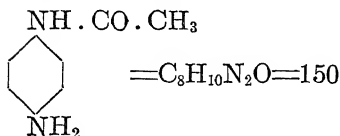
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? M '20:— ?		M
779	Alizarin Orange	I '20:— 8,575 I '14:— 14,239 M '19:— ? M '20:— ? I '20:— 500	[Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Sulfonation]	M
783	Purpurin		[Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[1-Nitro-alizarin, Re- duction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] <i>p</i> -Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

**Alpha =  $\alpha$**

*Note.*—This is not considered in the alphabetical arrangement,  
e.g. *alpha-Naphthol* is indexed as  *$\alpha$ -Naphthol* under "*N*."  
However  *$\beta$ -Naphthol* is placed after  *$\alpha$ -Naphthol*

**Alpha-Naphthol**

*See,  $\alpha$ -Naphthol under N.*

***p*-Amino-acetanilide** (*C. A. nomen.*)Acetyl-*p*-phenylene-diamine

STATISTICS.—Imported '14:—6,261 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:—177,990 lbs.  
 Manufactured '19:— 62,567 lbs.  
 Manufactured '20:— 97,275 lbs.

FORMATION.—From *p*-nitro-acetanilide by reduction with iron and acetic acid at not higher than 60° C.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 89  
 Lange, Zwischenprodukte, #558

**Dyes Derived from *p*-Amino-acetanilide**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
61	MONOAZO DYES Victoria Violet	I '14:— 52,365	Chromotropic Acid [Saponification]	A
		M '17:— ?		
		M '18:— ?		
		M '19:—105,086		
		I '20:— 2,082		
		M '20:— ?		
64	Azo Acid Red B Lanafuchsine	I '14:— 78,305	1-Naphthol-3: 6-disulfonic Acid	A
		M '17:— ?		
		M '18:— ?		
		M '19:— 15,272		
		I '20:— 674		
		M '20:— ?		
65	Azo Coralline L	M '17:— ?	R Acid	A
		M '18:— ?		
		M '19:— ?		
		I '20:— 249		
		M '20:— ?		

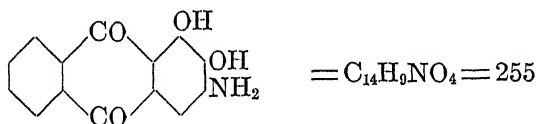


Dyes Derived from *p*-Amino-acetanilide (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
66	Amino Naphthol Red 6B	I '14:— 45,697 M '18:— ? M '19:— ? I '20:— 1,299 M '20:— 142,567	Acetyl-H Acid	A
67	Chromotrope 6B	I '14:— 2,818 M '17:— ? M '18:— ? M '19:— 77,481 M '20:— ?	Chromotropic Acid	A
	DISAZO DYES			
239	Azotol C		<i>m</i> -Phenylene-diamine [Amino-chrysoidine]	MF
243	Coomassie Wool Black R		$\beta$ -Naphthol $\alpha$ -Naphthylamine Schaeffer's Salt	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	$\alpha$ -Naphthylamine R Salt	A
290	Violet Black		Nevile-Winther Acid $\alpha$ -Naphthylamine	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Salicylic Acid (2 mols) <i>p</i> -Amino-acetanilide (2 mols) Phosgene	D
	SULFUR DYES			
714	Thiophor Yellow Bronze G		<i>p</i> -Phenylene-diamine Benzidine [Sulfur]	S
715	Thiocatechine		[Sulfur]	S

**3-Amino-alizarin** (*C. A. nomen.*)

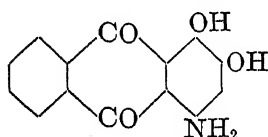
$\beta$ -Amino-alizarin



FORMATION.—From 3-nitro-alizarin by reduction.

## Dyes Derived from 3-Amino-alizarin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
803	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Nitro-alizarin [Glycerol]	M
804	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Nitro-alizarin [Glycerol]	M
808	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Nitro-alizarin [Glycerol; Oxidation]	M
809	Alizarin Indigo Blue S		3-Nitro-alizarin [Glycerol; Oxidation]	M

4-Amino-alizarin (*C. A. nomen.*) $\alpha$ -Amino-alizarin

$$= \text{C}_{14}\text{H}_9\text{NO}_4 = 255$$

STATISTICS.—See #797 in following table

FORMATION.—From 4-nitro-alizarin by reduction with alkaline sulfides

LITERATURE.—Schultz, Farbstofftabellen (1914 Ed.), #797

## Dyes Derived from 4-Amino-alizarin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
797	Alizarin Garnet R	I '14:— 720	[This is 4-Amino-alizarin]	M
805	Alizarin Green S	I '14:— 15,885	[Glycerol]	M

 $\alpha$ -Amino-alizarin

See, 4-Amino-alizarin (*C. A. nomen.*)

**$\beta$ -Amino-alizarin**

See, 3-Amino-alizarin (*C. A. nomen.*)

**2-Amino-5-(*p*-amino-phenyl)-benzene-sulfonic Acid** (*C. A. nomen.*  
 $SO_3H=1$ )

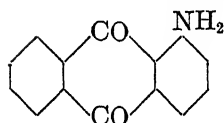
See, Benzidine-sulfonic Acid

***p*-(*p*-Amino-anilino)-phenol** (*C. A. nomen.*)

See, 4-Amino-4'-hydroxy-diphenylamine

**1-Amino-anthraquinone** (*C. A. nomen.*)

$\alpha$ -Amino-anthraquinone



$$= C_{14}H_9NO_2 = 223$$

FORMATION.—(1) From 1-nitro-anthraquinone by reduction with sodium sulfide

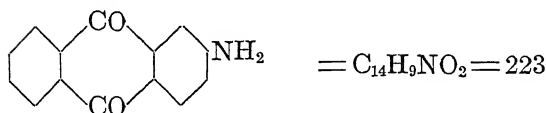
(2) From anthraquinone-1-sulfonic acid (potassium salt) by heating with 10 per cent ammonia in an autoclave to 180–190°

LITERATURE.—Ullmann, *Enzy. tech. Chemie.* **1**, 474

Lange, *Zwischenprodukte*, #3066, 3109, 3158

**Dyes Derived from 1-Amino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
814	Algol Yellow W G	I '14:—5,185 I '20:— 4	Benzoyl chloride	V
824	Algol Orange R	I '14:— 51 I '20:— 406	2-Chloro-anthraquinone	V
826	Indanthrene Red G		2: 6-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	
830	Indanthrene Red R	I '14:—2,099 I '20:—6,595	2: 7-Dichloro-anthraquinone 1-Amino-anthraquinone (2 mols)	V
834	Algol Gray B	I '14:—4,192 I '20:— 840	1-Chloro-anthraquinone [Nitration, Reduction]	V
870	Algol Corinth R	I '20:— 134	2-Chloro-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

**2-Amino-anthraquinone** (*C. A. nomen.*) $\beta$ -Amino-anthraquinone

STATISTICS.—Manufactured '19:—?

Manufactured '20:—?

FORMATION.—From sodium anthraquinone-2-sulfonate by heating with ammonia water in an autoclave at 200° C., preferably in the presence of an oxidizing substance

LITERATURE.—Ullmann, *Enzy. tech. Chemie*, 1, 476Lange, *Zwischenprodukte*, #3107Cain, *Intermediate Products* (2d Ed.), 254**Dyes Derived from 2-Amino-anthraquinone**

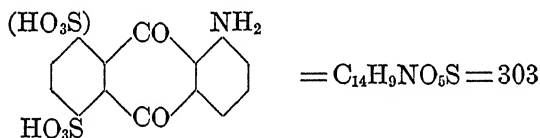
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
810	Helidone Yellow 3 G N	I '14:— 20,744 I '20:— 2,515	2-Amino-anthraquinone (2 mols) Phosgene	V
811	Algol Yellow 3G	I '14:— 1,604 I '20:— 570	2-Amino-anthraquinone (2 mols) [Succinic acid]	V
825	Algol Red B	I '14:— 2,399 I '20:— 4,151	4-Bromo-N-methyl-anthrapyridone	V
837	Indanthrene Blue R	I '14:— 500	2-Amino-anthraquinone (2 mols)	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	2-Amino-anthraquinone (2 mols) [Alkaline Reduction] [or Indanthrene Blue R reduced]	V
846	Indanthrene Dark Blue BT		2-Amino-anthraquinone (2 mols) [Glycerol (4 mols)] [or Benzanthrone-quinoline (2 mols)]	V

Dyes Derived from 2-Amino-anthraquinone (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
849	Indanthrene Yellow G	I '14:— 75,192 M '19:— ? I '20:— 75,665 M '20:— ?	2-Amino-anthraquinone (2 mols)	V
867	Indanthrene Brown B	I '14:— 6,175 I '20:— 3,511	2-Amino-anthraquinone (2 mols)	V

1:5- and 1:8-Amino-anthraquinone-sulfonic Acids

5-and 8-Amino-1-anthraquinone-sulfonic Acids (*C. A. nomen*)



FORMATION.—Anthraquinone is sulfonated to a mixture of 1:5-and 1:8-disulfonic acids, which are then partly amidated by treatment with ammonia

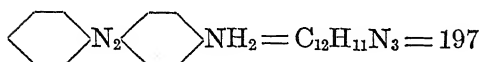
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 252

Ullmann, *Enzy. tech. Chemie*, **1**, 475

Lange, *Zwischenprodukte*, #3265

Dye Derived from 1:5- and 1:8-Amino-anthraquinone-sulfonic Acids

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
851	ANTHRAQUINONE AND ALLIED DYES Alizarin Direct Blue B	I '14:—10,201 I '20:— 2,982	[Dibromination] Aniline [Sulfonation]	A

**Amino-azo-benzene**Phenyl-azo-aniline (*C. A. nomen.*)

STATISTICS.—Imported '14:—very small  
 Manufactured '17:—141,888 lbs.  
 Manufactured '18:—171,594 lbs.  
 Manufactured '19:— 82,755 lbs.  
 Manufactured '20:—152,310 lbs.

FORMATION.—The amino-azo-benzene is prepared from aniline, by molecular rearrangement of diazo-amino-benzene, which in turn is made from aniline and diazo-benzene chloride (diazotized aniline)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 81

**Dyes Derived from Amino-azo-benzene**

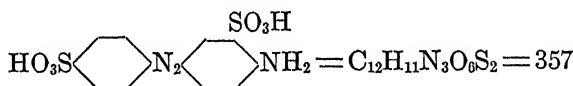
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
31	MONOAZO DYES Amino-azo-benzene Spirit Yellow	M '17:— ?	[Oleum]	SS
		M '18:— 52,283		
		M '19:— ?		
		M '20:— ?		
137	Fast Yellow Acid Yellow	I '14:— 37,378	[Oleum]	A
		M '17:— ?		
		M '18:— ?		
		I '20:— 7,848		
223	DISAZO DYES Sudan III	M '20:— ?	$\beta$ -Naphthol	SS MF
		I '14:— 2,409		
		M '17:— ?		
		M '18:— ?		
224	Cloth Red G	M '19:— ?	Nevile-Winther Acid	A
		M '20:— ?		
		I '14:— 401		
		M '19:— ?		
225	Croceine AZ	M '20:— ?	1-Naphthol-3: 6-disul- fonic Acid	A
		I '14:— 500		
226	Croceine B	'20:— 100	1-Naphthol-4: 8-disul- fonic Acid	A

Dyes Derived from Amino-azo-benzene (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	DISAZO DYES ( <i>continued</i> )			
227	Brilliant Croceine M	I '14:—125,137 M '17:— ? M '18:— 84,643 M '19:—157,509 I '20:— 49 M '20:—129,124	G Acid	A
228	Ponceau 5R Erythrine P	I '14:— 2,880 M '17:— ? M '19:— ?	2-Naphthol-3: 6: 8-trisulfonic Acid	A
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
	AZINE DYES			
696	Indamine Blue		Aniline (excess)	B
697	Induline (Spirit Soluble)	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:—436,201 M '20:—140,400	Aniline (excess)	ss
699	Induline (Water Soluble)	I '14:— 29,177 M '17:—183,739 M '18:— 91,724 M '19:—130,704 I '20:— 500 M '20:—168,048	Aniline (excess) [Sulfonation]	A
701	Paraphenylene Blue R		<i>p</i> -Phenylene-diamine	B

Amino-azo-benzene-disulfonic Acid

6-Amino-3: 4'-azo-bisbenzene-sulfonic Acid (*C. A. nomen.*)



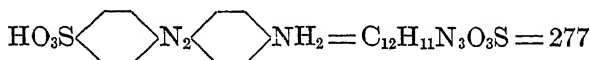
FORMATION.—From amino-azo-benzene by sulfonation with oleum

## Dyes Derived from Amino-azo-benzene-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
247	DISAZO DYES Double Scarlet Scarlet EC	I '14:— 39,522 M '17:— ? M '18:— 74,203 M '19:— ? M '20:— ?	$\beta$ -Naphthol	A
251	Croceine Scarlet O	I '20:— 100	Croceine Acid	A

## Amino-azo-benzene-sulfonic Acid

*p*-(*p*-Amino-phenyl-azo)-benzene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—From amino-azo-benzene by sulfonation at low temperature by means of oleum

## Dyes Derived from Amino-azo-benzene-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
246	DISAZO DYES Cloth Scarlet G	I '14:— 9 I '17:— ? I '18:— ? I '19:— ? I '20:— ?	$\beta$ -Naphthol	A
248	Fast Scarlet B	I '14:— 1,755	Schaeffer's Acid	A
249	Croceine Scarlet 3B	I '14:— 9,613	Croceine Acid	A
250	Milling Orange	I '14:— 4,370	Salicylic Acid	M

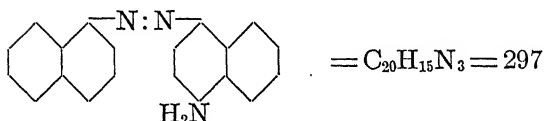
6-Amino-3: 4'-azo-bisbenzene-sulfonic Acid (*C. A. nomen.*)

See, Amino-azo-benzene-disulfonic Acid



***α*-Amino-azo-naphthalene**

4-(Naphthyl-azo)-1-naphthylamine (*C. A. nomen.*)



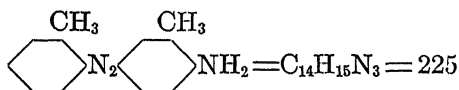
FORMATION.—From *α*-naphthylamine, this compound is prepared by mixing equal molecules of *α*-diazo-naphthalene chloride (from *α*-naphthylamine) and *α*-naphthylamine hydrochloride in cold aqueous solution.

**Dyes Derived from *α*-Amino-azo-naphthalene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	AZINE DYES			
694	Rose Magdala	I '14:— 597	<i>α</i> -Naphthylamine	A
695	Fast Pink for Silk Paraphenylene Violet	I '20:— 337	<i>p</i> -Phenylenc-diamine	B

***o*-Amino-azo-toluene**

*p*-(*o*-Tolyl-azo)-*o*-toluidine (*C. A. nomen.*)



STATISTICS.—Manufactured 1917:—14,355 lbs.

Manufactured 1918:— ?

Manufactured 1919:— 4,836

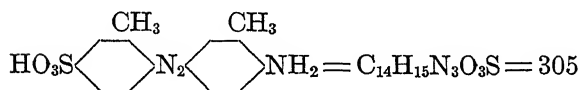
Manufactured 1920:— ?

FORMATION.—From *o*-toluidine, by molecular rearrangement of diazo-amino-toluene, which in turn is made by the reaction of equal molecules of *o*-toluidine and diazo-toluene chloride (diazotized *o*-toluidine)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 82.

Dyes Derived from *o*-Amino-azo-toluene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
MONOAZO DYES				
68	Spirit Yellow R		[This is amino-azo-toluene]	ss
149	Yellow Fat Color Fast Yellow R		[Oleum]	A
DISAZO DYES				
230	Cloth Red 3 GA	I '14:— 251	Bronner's Acid	M
231	Cloth Red 3B Extra	I '14:— 15 I '20:— 84	Ethyl-2-naphthyl-amine-7-sulfonic Acid	M
232	Sudan IV	I '14:— 51 M '17:— 13,334 M '18:— 14,904 M '19:— ? M '20:— ?	$\beta$ -Naphthol	ss MF
233	Cloth Red B	I '14:— 1,962 M '18:— ? M '19:— ? M '20:— ?	Nevile-Winther Acid	M
234	Cloth Red G	I '14:— 554	Schaeffer's Acid	M
235	Croceine 3B	M '19:— ? M '20:— ?	1-Naphthol-4: 8-disulfonic Acid	A
236	Cloth Red B Wool Red B	I '14:— 14,293 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	R Acid	A

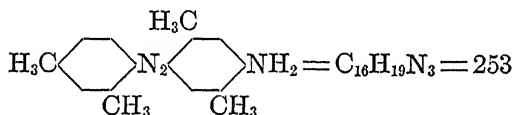
*o*-Amino-azo-toluene-sulfonic Acid4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid (*C. A. nomen.*)FORMATION.—*o*-Amino-azo-toluene is sulfonated with oleum

Dyes Derived from *o*-Amino-azo-toluene-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	DISAZO DYES			
252	Cloth Scarlet R		$\beta$ -Naphthol <sup>1</sup>	M
253	Orseiline BB		Nevile-Winther's Acid	A
254	Bordeaux G		Schaeffer's Acid	A
255	Croceine Scarlet 8B Ponceau 6RB	I '14:—2,379 I '20:— 154	Croceine Acid <sup>1</sup>	A

Amino-azo-xylene

4-(2: 4-Xylyl-azo)-2: 5-xylidine (*C. A. nomen.*)



FORMATION.—From xylidine, and by action of diazo-*m*-xylidine (2: 4-xylidine) on *p*-xylidine (2: 5-xylidine)

LITERATURE.—Nölting and Forel, *Ber.* **18**, 2668 (1885)

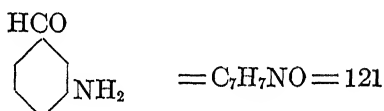
Nietzki, *Ber.* **13**, 471 (1880)

Schultz, *Chemie Steinkohlenteers* **1**, 137

Dyes Derived from Amino-azo-xylene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	DISAZO DYES			
237	Bordeaux BX		Schaeffer's Acid	A
238	Union Fast Claret		R Acid	A

*m*-Amino-benzaldehyde

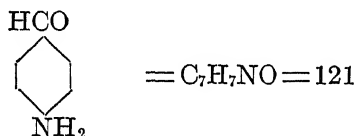


**FORMATION.**—Benzaldehyde is nitrated, resulting in a mixture of *o*- and *m*-nitro-benzaldehyde (20 and 80 per cent). The reduction is effected and the *o*-derivative is removed by treating the crude nitration mixture with sodium hydrosulfite and hydrochloric acid, whereupon the *o*-derivative crystallizes out as the anhydro-derivative of *o*-amino-benzaldehyde. The solution contains the *m*-amino-benzaldehyde, and it is used directly

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 144, 145  
Lange, *Zwischenprodukte*, #316-318

**USES.**—For preparation of *m*-Hydroxy-benzaldehyde

***p*-Amino-benzaldehyde**



**FORMATION.**—*p*-Nitro-toluene, in alcoholic solution, is run into a solution of sulfur in caustic soda; and the mixture is heated under a reflux condenser for 1½ hours, and then separated

**LITERATURE.**—Lange, *Zwischenprodukte*, #319-327  
Ullmann, *Enzy. tech. Chemie*, 2, 307

**Dyes Derived from *p*-Amino-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
129	MONOAZO DYES Chromazone Red A	I'14:—243	Chromotropic Acid	M
130	Chromazone Blue R		Chromotropic Acid Ethyl-phenyl-hydrazine	M

***p*-Amino-benzaldehyde Ethyl-phenyl-hydrazone** (*C. A. nomen.*)

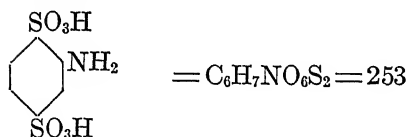
*See, p*-Amino-benzylidene-ethyl-phenyl-hydrazone

**1-Amino-4-benzamido-anthraquinone** (*C. A. nomen.*)

*See, 1*-Amino-4-benzoylamino-anthraquinone

**2-Amino-*p*-benzene-disulfonic Acid** (*C. A. nomen.*)

Aniline-2: 5-disulfonic Acid



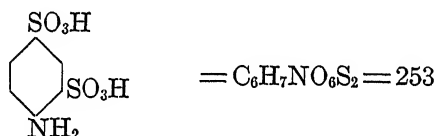
FORMATION.—The sodium salt of 4-chloro-3-nitro-benzene-sulfonate is boiled with sodium sulfite, resulting in formation of sodium 2-nitro-benzene-disulfonate, which is reduced with iron and acetic acid to aniline-2: 5-disulfonic acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 49  
Lange, *Zwischenprodukte*, #957

USES.—For preparation of ethyl-*m*-amino-phenol

**4-Amino-*m*-benzene-disulfonic Acid** (*C. A. nomen.*)

Aniline-2: 4-disulfonic Acid



FORMATION.—By heating sulfanilic acid (*p*-aniline-sulfonic acid) with oleum at 170–180° C.

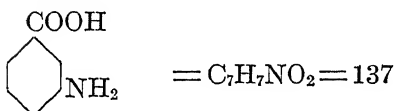
LITERATURE.—Ann. 198, 17  
Beilstein, *Organische Chemie* (3 auf.) II, 571

**Dye Derived from 4-Amino-*m*-benzene-disulfonic Acid**

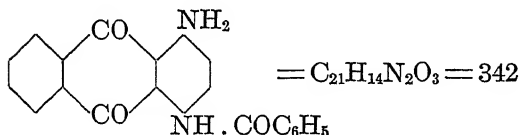
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
263	DISAZO DYE Jet Black R		$\alpha$ -Naphthylamine Phenyl- $\alpha$ -naphthylamine	A

***m*-Amino-benzene-sulfonic Acid**

See, Metanilic Acid

***p*-Amino-benzene-sulfonic Acid***See*, Sulfanilic Acid**Amino-benzenyl-*o*-amino-thio-cresol***See*, Dehydro-thio-*p*-toluidine***m*-Amino-benzoic Acid**FORMATION.—*m*-Nitro-benzoic acid is reduced with iron and acetic acidLITERATURE.—Ullmann, *Enzy. tech. Chemie*, **2**, 333**Dyes Derived from *m*-Amino-benzoic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
203	MONOAZO DYES Yellow Fast-to-soap		Diphenylamine	M
204	Diamond Yellow G		Salicylic Acid	M
486	TETRAKISAZO DYE Direct Brown J	I '14:—3,640	<i>m</i> -Phenylene-diamine (3 mols) <i>m</i> -Amino-benzoic Acid (2 mols)	D

***o*-Amino-benzoic Acid***See*, Anthranilic Acid**1-Amino-4-benzoylamino-anthraquinone**1-Amino-4-benzamido-anthraquinone (*C. A. nomen.*)

FORMATION.—By heating 1:4-Diamino-anthraquinone in a toluene or nitro-benzene solution with benzoyl chloride

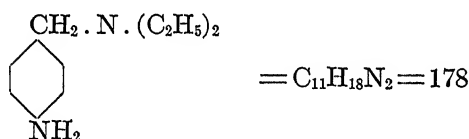
LITERATURE.—Cf. Ullmann, Enzy. tech. Chemie, 1, 164

**Dye Derived from 1-Amino-4-benzoylamino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
833	ANTHRAQUINONE AND ALLIED DYES Algol Olive R	I '14:—13,334 I '20:— 461	1-Benzoylamino-4-chloro-anthraquinone [Chloro-sulfonic Acid]	V

***p*-Amino-benzyl-diethylamine**

*p*-Amino-*N*:*N*-diethyl-benzylamine (*C. A. nomen.*)



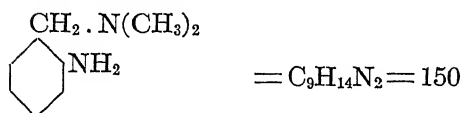
FORMATION.—*p*-Nitro-benzyl chloride is treated with 2 mols of diethylamine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-diethylamine is reduced with SnCl<sub>2</sub> and HCl to the *p*-amino-benzyl-diethylamine

LITERATURE.—Ber. 28, 1141

Cf. Lange, Zwischenprodukte, #255

**Dye Derived from *p*-Amino-benzyl-diethylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
435	TRISAZO DYE Janus Brown B		$\alpha$ -Naphthylamine Resorcinol or <i>m</i> -phenylene-diamine [or Chrysoidine]	B

***o*-Amino-benzyl-dimethylamine***o*-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)

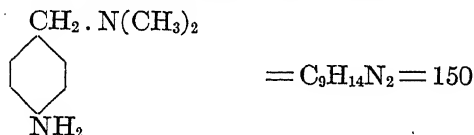
FORMATION.—*o*-Nitro-benzyl chloride is treated with 2 mols of dimethylamine in alcoholic solution at 100° C., and the resulting *o*-nitro-benzyl-dimethylamine is reduced with SnCl<sub>2</sub> and HCl to the *o*-amino-benzyl-dimethylamine

LITERATURE.—*Cf.* Ber. 28, 1141

*Cf.* Lange, Zwischenprodukte, #250, 255

**Dyes Derived from *o*-Amino-benzyl-dimethylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
74	MONOAZO DYES Tannin Orange	I '14:—2,202 I '20:— 349	<i>p</i> -Amino-benzyl-dimethylamine $\beta$ -Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	<i>p</i> -Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

***p*-Amino-benzyl-dimethylamine***p*-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)

FORMATION.—*p*-Nitro-benzyl chloride is treated with 2 mols of dimethylamine in alcoholic solution at 100° C.; and the resulting *p*-nitro-benzyl-dimethylamine is reduced with SnCl<sub>2</sub> and HCl to the *p*-amino-benzyl-dimethylamine

LITERATURE.—Ber. 28, 1141

Lange, Zwischenprodukte, #255



**Dyes Derived from *p*-Amino-benzyl-dimethylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
74	MONOAZO DYES Tannin Orange R	I '14:—2,202 I '20:— 249	<i>o</i> -Amino-benzyl-dimethylamine $\beta$ -Naphthol (2 mols)	B
75	New Phosphine G	I '14:— 500	<i>o</i> -Amino-benzyl-dimethylamine Resorcinol (2 mols)	B

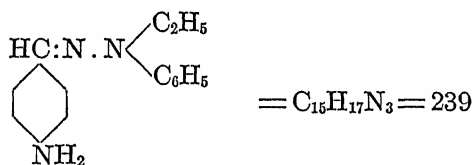
***p*-Amino-benzyl-ethyl-aniline-sulfonic Acid**

*See*, Ethyl-sulfobenzyl-*p*-phenylene-diamine

***p*-Amino-benzylidene-ethyl-phenyl-hydrazone**

Ethyl-phenyl-hydrazone of *p*-Amino-benzaldehyde

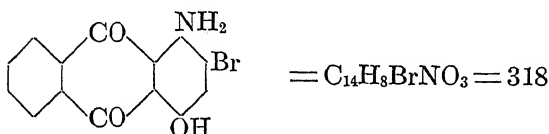
*p*-Amino-benzaldehyde Ethyl-phenyl-hydrazone (*C. A. nomen.*)



FORMATION.—By condensation of ethyl-phenyl-hydrazine and *p*-amino-benzaldehyde

**Dye Derived from *p*-Amino-benzylidene-ethyl-phenyl-hydrazone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
130	MONOAZO DYE Chromazone Blue R		Chromotropic Acid	M

**1-Amino-2-bromo-4-hydroxy-anthraquinone**4-Amino-3-bromo-1-hydroxy-anthraquinone (*C. A. nomen.*)

FORMATION.—From 1-amino-2:4-dibromo-anthraquinone by heating with monohydrate at 100–110°

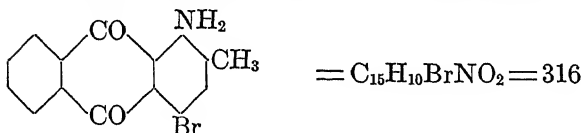
LITERATURE.—Lange, Zwischenprodukte, #3314

**Dye Derived from 1-Amino-2-bromo-4-hydroxy-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
844	ANTHRAQUINONE AND ALLIED DYES Algol Blue 3G	I '14:—9,191 I '20:—3,896	1-Amino-2-bromo-4-hydroxy-anthraquinone (2 mols)	V

**4-Amino-3-bromo-1-hydroxy-anthraquinone (*C. A. nomen.*)**

See, 1-Amino-2-bromo-4-hydroxy-anthraquinone

**1-Amino-4-bromo-2-methyl-anthraquinone**

FORMATION.—2-methyl-anthraquinone (which is obtained by the condensation of toluene with phthalic anhydride) is nitrated and reduced. The resulting 1-amino-2-methyl-anthraquinone is brominated in a glacial acetic acid solution and the 1-amino-4-bromo-2-methyl-anthraquinone is formed

LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 486

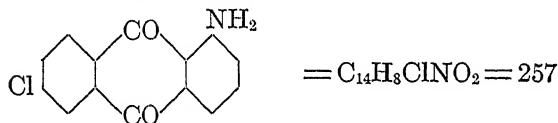
Barnett, Anthracene and Anthraquinone, 80, 192, 229

Cain, Intermediate Products (2d Ed.), 260

Dyes Derived from 1-Amino-4-bromo-2-methyl-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
859	ANTHRAQUINONE AND ALLIED DYES Cyananthrol R	I '14:—18,792 I '20:— 2,416	<i>p</i> -Toluidine [Sulfonation]	A
860	Cyananthrol G	I '20:— 5,127	<i>p</i> -Toluidine [Sulfonation]	A

1-Amino-6-chloro-anthraquinone



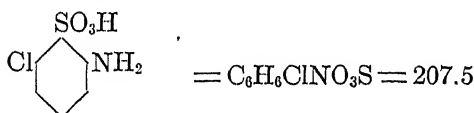
Dye Derived from 1-Amino-6-chloro-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
827	ANTHRAQUINONE AND ALLIED DYES Indanthrene Bordeaux B extra	I '14:—28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols) 2: 7-Dichloro-anthraquinone	V

2-Amino-6-chloro-benzene-sulfonic Acid (*C. A. nomen.*)

3-Chloro-aniline-2-sulfonic Acid

*m*-Chloro-aniline-*o*-sulfonic Acid



FORMATION.—By the reduction of *m*-chloro-nitro-benzene-*o*-sulfonic acid in the usual way.

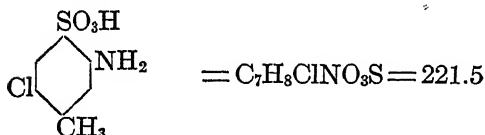
LITERATURE.—Beil. II, 571

**Dye Derived from 2-Amino-6-chloro-benzene-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
131	MONOAZO DYE Permanent Orange R		$\beta$ -Naphthol	CL

**1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid**

See, 2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*C. A. nomen.*  
 $SO_3H = 1$ )

**2-Amino-5-chloro-*p*-toluene-sulfonic Acid** (*C. A. nomen.*  $SO_3H = 1$ )**2-Chloro-5-toluidine-4-sulfonic Acid** ( $CH_3 = 1$ )**1-Amino-4-chloro-3-methyl-benzene-6-sulfonic Acid**

STATISTICS.—Manufactured '20:—22,753 lbs

FORMATION.—From *o*-chloro-toluene-*p*-sulfonic acid ( $CH_3 = 1$ ) by nitration and subsequent reduction

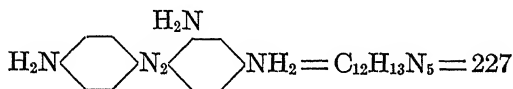
LITERATURE.—Lange, Zwischenprodukte, #1022

**Dye Derived from 2-Amino-5-chloro-*p*-toluene-sulfonic Acid** ( $SO_3H = 1$ )

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
153	MONOAZO DYE Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105	$\beta$ -Naphthol	CL

4-Amino-chrysoidine (C.A. nomen.)

2:4:4'-Triamino-azo-benzene



FORMATION.—(1) *p*-Amino-acetanilide (acetyl-*p*-phenylene-diamine) is diazotized and combined with *m*-phenylene-diamine, and then the acetyl group removed

(2) *p*-Nitro-aniline is diazotized and combined with *m*-phenylene-diamine, and the product reduced with sodium sulfide

LITERATURE.—Lange, Zwischenprodukte, #1765

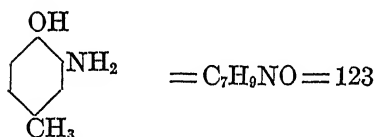
Dye Derived from 4-Amino-chrysoidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
239	DISAZO DYE Azotol C		$\beta$ -Naphthol	MF

2-Amino-*p*-cresol (*OH*=1, C. A. nomen.)

*m*-Amino-*p*-cresol (*CH*<sub>3</sub>=1)

3-Amino-*p*-cresol (*Eng. and Germ. nomen. CH*<sub>3</sub>=1)



FORMATION.—(1) *p*-Cresol is nitrated and then reduced with SnCl<sub>2</sub> and HCl. (2) *p*-Toluidine is treated with nitric and nitrous acids so as to form 2-nitro-*p*-cresol (*OH*=1), which is then reduced to the amino compound

LITERATURE.—Ber. 22, 348; 24, 1960  
Beil. II, 752

Dye Derived from 2-Amino-*p*-cresol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
260	DISAZO DYE Erio-Chrome Verdon	I '14:—882	Sulfanilic acid $\beta$ -Naphthol	ACr

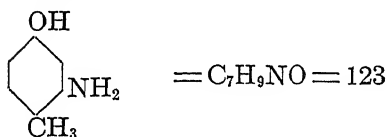
**3-Amino-*p*-cresol** (*Eng. and Ger. nomen.*  $\text{CH}_3=1$ )

*See*, 2-Amino-*p*-cresol ( $\text{OH}=1$ , *C. A. nomen.*)

**3-Amino-*p*-cresol** ( $\text{OH}=1$ , *C. A. nomen.*)

6-Amino-*p*-cresol ( $\text{CH}_3=1$ )

*o*-Amino-*p*-cresol ( $\text{CH}_3=1$ , *Ger. and English nomen.*)



**FORMATION.**—*p*-Toluidine is nitrated, and the 3-nitro-*p*-toluidine sulfate ( $\text{NH}_2=1$ ) therefrom is treated with  $\text{NaNO}_2$  in the cold and then boiled with dilute sulfuric acid, thus forming 3-nitro-*p*-cresol, which latter on reduction with  $\text{SnCl}_2$  and  $\text{HCl}$  gives 3-amino-*p*-cresol

**LITERATURE.**—Beil. II, 751, 753

Dye Derived from 3-Amino-*p*-cresol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
576	XANTHONE DYE Rhodamine 3G	I '14:—19,568 I '20:— 855	Dimethylamino - hydroxy - benzoyl - benzoic acid [Ethyl esterification]	B

**6-Amino-*p*-cresol** ( $\text{CH}_3=1$ )

*See* 3-Amino-*p*-cresol ( $\text{OH}=1$ , *C. A. nomen.*)

***m*-Amino-*p*-cresol** ( $CH_3=1$ )

*See*, 2-Amino-*p*-cresol ( $OH=1$ , *C. A. nomen.*)

***o*-Amino-*p*-cresol** ( $CH_3=1$ )

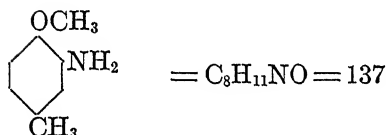
*See*, 3-Amino-*p*-cresol ( $OH=1$ , *C. A. nomen.*)

**2-Amino-*p*-cresol Methyl Ether** ( $OCH_3=1$ )

6-Methoxy-*m*-toluidine (*C. A. nomen.*  $NH_2=1$ )

*m*-Amino-*p*-cresol Methyl Ether ( $CH_3=1$ )

3-Amino-4-cresol Methyl Ether ( $CN_3=1$ )

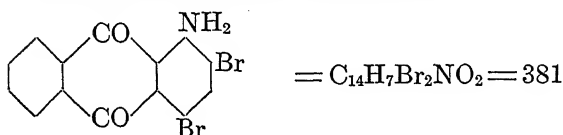


FORMATION.—2-Nitro-*p*-cresol ( $OH=1$ ), obtained by action of nitrous and excess nitric acids upon *p*-toluidine, is methylated and reduced

LITERATURE.—Ber. 22, 348; 24, 960

**Dyes Derived from 2-Amino-*p*-cresol Methyl Ether ( $OCH_3=1$ )**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
96	MONOAZO DYES Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
100	Eosamine B	I '14:—1,914 I '20:—1,600	1-Naphthol-3: 8-disulfonic Acid	A
101	Coccine B		R Acid	A
439	TRISAZO DYES Direct Indigo Blue A	M '18:— ?	Benzidine H Acid (2 mols)	D
440	Direct Indigo Blue BK		Benzidine Gamma Acid (2 mols)	D

*m*-Amino-*p*-cresol Methyl Ether ( $\text{CH}_3=1$ )See, 2-Amino-*p*-cresol Methyl Ether ( $\text{OCH}_3=1$ )**1-Amino-2: 4-dibromo-anthraquinone**

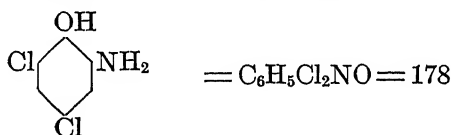
FORMATION.—1-Amino-anthraquinone is treated in nitro-benzene solution and at about 120–130° with an excess of bromine

LITERATURE.—Ullmann, *Enzy. tech Chemie*, **1**, 475

Ger. Pat., 160,169

**Dye Derived from 1-Amino-2: 4-dibromo-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
855	ANTHRAQUINONE AND ALLIED DYES Alizarin Pure Blue B		<i>p</i> -Toluidine [Sulfonation]	ACr

**2-Amino-4: 6-dichloro-phenol**

FORMATION.—4: 6-Dichloro-2-nitro-phenol is reduced with tin and hydrochloric acid

LITERATURE.—Beil. II, 727

**Dye Derived from 2-Amino-4: 6-dichloro-phenol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
86	MONOAZO DYE Azarine S		$\beta$ -Naphthol	M



**4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid**

*See*, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-diethyl-aniline**

*See*, *N*: *N*-Diethyl-*p*-phenylene-diamine (*C. A. nomen.*)

***p*-Amino-diethyl-aniline-thiosulfonic Acid**

*See*, Diethyl-*p*-phenylene-diamine-thiosulfonic Acid

***p*-Amino-*N*: *N*-diethyl-benzylamine (*C. A. nomen.*)**

*See*, *p*-Amino-benzyl-diethylamine

**2-Amino-5-dimethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)**

*See*, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***m*-Amino-dimethyl-aniline**

*See* *N*: *N*-Dimethyl-*m*-phenylene-diamine (*C. A. nomen.*)

***p*-Amino-dimethyl-aniline**

*See*, *N*: *N*-Dimethyl-*p*-phenylene-diamine (*C. A. nomen.*)

***p*-Amino-dimethyl-aniline-thiosulfonic Acid**

*See*, Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid

***o*-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)**

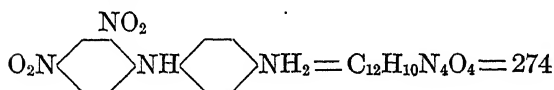
*See*, *o*-Amino-benzyl-dimethylamine

***p*-Amino-*N*: *N*-dimethyl-benzylamine (*C. A. nomen.*)**

*See*, *p*-Amino-benzyl-dimethylamine

**4'-Amino-2:4-dinitro-diphenylamine**

*N*-2:4-Dinitro-phenyl)-*p*-phenylene-diamine (*C. A. nomen.*)



FORMATION.—1-Ch'oro-2: 4-dinitro-benzene is condensed with *p*-phenylene-diamine

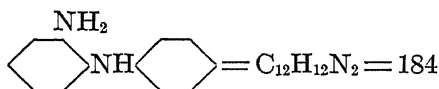
LITERATURE.—Lange, Zwischenprodukte, #1666

**Dye Derived from 4'-Amino-2: 4-dinitro-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
727	SULFUR DYE Auronal Black B		[Glycerol; S + Na <sub>2</sub> S]	S

***o*-Amino-diphenylamine**

*N*-Phenyl-*o*-phenylene-diamine (*C. A. nomen.*)



FORMATION.—By reducing *o*-nitro-diphenylamine (from *o*-bromo-nitro-benzene and aniline) by heating with ammonium sulfide

LITERATURE.—Lange, Zwischenprodukte, #1611

Chem. Zeitung, 18, 1095

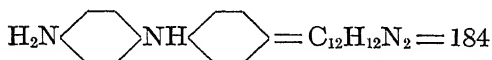
Ber. 23, 1843

**Dye Derived from *o*-Amino-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
668	AZINE DYE Flavinduline O	I '14:—660	Phenanthrene-quinone	B

***p*-Amino-diphenylamine**

*N*-Phenyl-*p*-phenylene-diamine (*C. A. nomen.*)



FORMATION.—This intermediate can be prepared by reducing Orange IV, by means of sodium sulfide and sulfur. The Orange IV results from the coupling of diazotized sulfanilic acid with diphenylamine

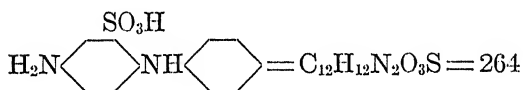
LITERATURE.—Lange, Zwischenprodukte, #1611  
Cain, Intermediate Products (2d Ed.), 74

**Dyes Derived from *p*-Amino-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
687	<p>AZINE DYE</p> <p>Rosolan O</p>	I '20:—1,083	Aniline <i>o</i> -Toluidine [Oxidation]	B
922	<p>ANILINE BLACK GROUP</p> <p>Diphenyl Black</p>	<p>I '14:—1,470</p> <p>M '19:— ?</p> <p>M '20:— ?</p>	<i>p</i> -Amino-(diphenyl-amine (x mols) [Oxidation]	Special

***p*-Amino-diphenylamine-2-sulfonic Acid**

2-Anilino-5-amino-benzene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—*p*-Chloro-nitro-benzene is sulfonated to 2-chloro-5-nitro-benzene-sulfonate, which latter in presence of glycerol and sodium carbonate is condensed with aniline to form *p*-nitro-diphenylamine-2-sulfonic acid. This is reduced by iron and hydrochloric acid, resulting in *p*-amino-diphenylamine-2-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 75  
Cf. Lange, Zwischenprodukte, #1646, 1647

USES.—For preparation of the Nerol Dyes

*α*-(*p*-Amino-*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (C. A. *nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine

*α*-(4-Amino-*N*-ethyl-3-sulfomercapto-anilino)-*p*-toluene-sulfonic Acid (C. A. *nomen.*)

See, Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid

*p*-Amino-ethyl-*o*-toluidine ( $CH_3=1$ )

See, *N*<sup>3</sup>-Ethyl-4-*m*-tolylene-diamine (C. A. *nomen.*  $NH_2=1$ )

*p*-Amino-ethyl-*o*-toluidine ( $NH_2=1$ )

See, *N*<sup>1</sup>-Ethyl-*p*-tolylene-diamine

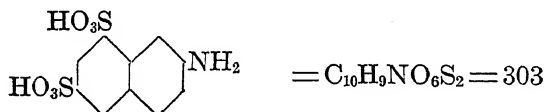
### Amino-G Acid<sup>1</sup>

2-Naphthylamine-6:8-disulfonic Acid

7-Amino-1:3-naphthalene-disulfonic Acid (C. A. *nomen.*)

*β*-Naphthylamine-*γ*-disulfonic Acid

*β*-Naphthylamine-disulfonic Acid G



STATISTICS.—Manufactured 1918:— ?

Manufactured 1919:— ?

Manufactured 1920:—894,624 lbs.

FORMATION.—From G acid, by heating the sodium salt with ammonia and sodium bisulfite solution, in an autoclave under pressure

LITERATURE.—Lange, *Zwischenprodukte*, #2599

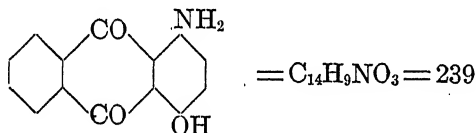
Cain, *Intermediate Products* (2d Ed.), 209

<sup>1</sup> Occasionally in the older literature, this 2-naphthylamine-6:8-disulfonic Acid has been called G Acid.

## Dyes Derived from Amino-G Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
178	MONOAZO DYE Crumpsall Yellow		Salicylic Acid	A
270	DISAZO DYES Brilliant Croccine 9B		Aniline G and R Acids	A
271	Diamine Blue 6G		1-Amino-2-naphthol ethyl ether $\beta$ -Naphthol	D
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	$\alpha$ -Naphthylamine R Acid	A

## 1-Amino-4-hydroxy-anthraquinone

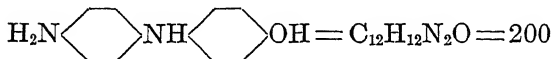
4-Amino-1-hydroxy-anthraquinone (*C. A. nomen.*)

FORMATION.—(1) From quinazarin by heating with ammonia. (2) From 1-amino-anthraquinone by heating with sulfuric acid (66° Be.) and boric acid to 180–200° C.

LITERATURE.—Lange, Zwischenprodukte, #3253–3255

## Dye Derived from 1-Amino-4-hydroxy-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
818	ANTHRAQUINONE AND ALLIED DYES Algol Pink R	I '14:— 126 I '20:—1,368	Benzoyl chloride	V

**4-Amino-1-hydroxy-anthraquinone** (*C. A. nomen.*)*See*, 1-Amino-4-hydroxy-anthraquinone**4-Amino-4'-hydroxy-diphenylamine***p*-(*p*-Amino-anilino)-phenol (*C. A. nomen.*)

FORMATION.—From phenol and *p*-phenylene-diamine by oxidation at low temperature

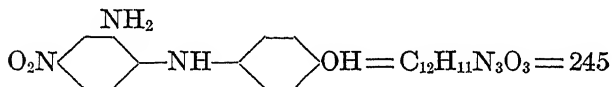
LITERATURE.—Lange, *Zwischenprodukte*, #1639-1643

**Dye Derived from 4-Amino-4'-hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
732	SULFUR DYE Autogene Black	I '14:—7,495	Phenol [S <sub>2</sub> Cl <sub>2</sub> ; S + Na <sub>2</sub> S]	S

**2-Amino-7-hydroxy-diphenylenazine***See*, 2-Amino-8-hydroxy-phenazine**2-Amino-4'-hydroxy-4-nitro-diphenylamine**

4-Nitro-2-amino-4'-hydroxy-diphenylamine

*p*-(2-Amino-4-nitro-anilino)-phenol (*C. A. nomen.*)

FORMATION.—Chloro-dinitro-benzene is condensed with *p*-amino-phenol in presence of an acetate to 2:4-dinitro-4'-hydroxy-diphenylamine, which by partial reduction furnishes the above derivative.

LITERATURE.—Beil II, *spl.*, 399; IV, *spl.*, 397

Lange, *Zwischenprodukte*, #1670

Thorpe, *Dic. Chemistry*, 2, 245

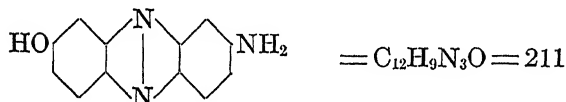
**Dyes Derived from 2-Amino-4'-hydroxy-4-nitro-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
726	SULFUR DYES Pyrogene Direct Blue Pyrogene Blue	I '14:—10,934 I '20:— 2,498	[Alcohol; S+Na <sub>2</sub> S]	S
730	Pyrogene Black G	I '14:— 8,725	[S+Na <sub>2</sub> S; <i>It is not certain that the amino-hydroxy-nitro-diphenylamine referred to is the one with the positions given above</i> ]	S
736	Thion Blue B	I '14:— 7,353 I '20:—11,855	[CS <sub>2</sub> ; S+Na <sub>2</sub> S]	S

**2-Amino-8-hydroxy-phenazine**

2-Amino-7-hydroxy-diphenylenazine

8-Amino-2-phenazinol (*C. A. nomen.*)



FORMATION.—1-Chloro-2:4-dinitro-benzene condensed with *p*-amino-phenol, the product reduced, and the resulting diamino-hydroxy-diphenylamine oxidized in alkaline solution with manganese dioxide

LITERATURE.—Lange, *Zwischenprodukte*, #1969

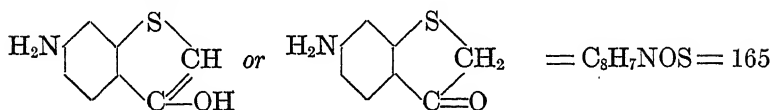
Cain, *Intermediate Products* (2d Ed.), 83

**Dye Derived from 2-Amino-8-hydroxy-phenazine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
739	SULFUR DYE Immedial Bordeaux G Immedial Maroon B	I '14:—15,496	[S+Na <sub>2</sub> S]	S

5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)

6-Amino-3-hydroxy-thionaphthene (*German numbering*)



FORMATION.—4-Acetamido-2-amino-benzoic acid is diazotized, reacted first with potassium xanthate ( $\text{C}_2\text{H}_5\text{O} \cdot \text{CS} \cdot \text{SK}$ ) and then with chloro-acetic acid, forming 4-acetamido-2-thioglycolic-benzoic acid, which by melting forms the desired 5-amino-2-hydroxy-thionaphthene

LITERATURE.—Lange, *Zwischenprodukte*, #2166

Ullmann, *Enz. tech. Chemie*, **3**, 568

### Dyes Derived from 5-Amino-2-hydroxy-thionaphthene

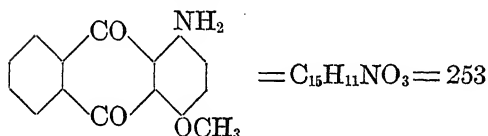
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
902	INDIGO GROUP DYES Helindone Brown 2R	I '14:— 876 I '20:— 1,778	2-Isatin-anilide [Bromination; ? classification]	V
903	Helindone Brown 5R		2-Isatin-anilide [Bromination]	V
904	Helindone Brown G	I '14:—13,086 I '20:— 2,200	Isatin [Bromination]	V
911	Ciba Orange G	I '14:— 222	Acenaphthenequinone [Bromination]	V
914	Helindone Orange D	I '20:— 17	5-Amino-2-hydroxy-thionaphthene (2 mols) [Bromination]	V

6-Amino-3-hydroxy-thionaphthene (*German numbering*)

See, 5-Amino-2-hydroxy-thionaphthene (*C. A. numbering*)



**1-Amino-4-methoxy-anthraquinone**



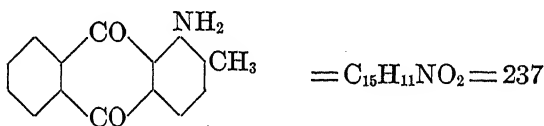
FORMATION.—Probably by the nitration and subsequent reduction of 1-methoxy-anthraquinone. The 1-methoxy-anthraquinone is obtained from 1-nitro-anthraquinone by heating with an alcoholic solution of potassium methylate with exclusion of water

LITERATURE.—*Cf.* Barnett, Anthracene and Anthraquinone, 169, 279, 280, 287

**Dyes Derived from 1-Amino-4-methoxy-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
815	ANTHRAQUINONE AND ALLIED DYES Algol Scarlet G	I '20:—959	Benzoyl chloride	V
829	Algol Bordeaux 3B	I '20:— 61	1-Amino-4-methoxy-anthraquinone (2 mols) 2: 6-Dichloro-anthraquinone	V

**1-Amino-2-methyl-anthraquinone**



FORMATION.—2-Methyl-anthraquinone is dissolved in sulfuric acid solution and nitrated with sodium nitrate. The nitro compound is then separated and reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 260  
Lange, Zwischenprodukte, #3209

## Dye Derived from 1-Amino-2-methyl-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
868	ANTHRAQUINONE AND ALLIED DYES Cibanone Brown B	I '14:—399	[Sulfur]	V

## 3-Amino-4-methyl-diphenylamine

*See, N*<sup>1</sup>-Phenyl-4-*m*-tolylene-diamine

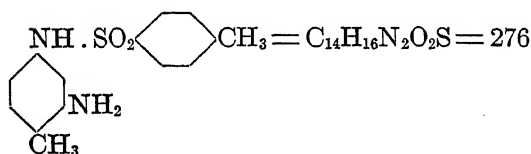
## IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

*See, Dehydro-thio-p*-toluidine-sulfonic Acid

*N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

3'-Amino-(*p*-toluene-sulfo)-*p*-toluide (*C. A. nomen.*)

(*Example of m-amino-aryl-sulfamide*)



FORMATION.—3-Nitro-*p*-toluidine ( $\text{NH}_2=1$ ) is suspended in water, *p*-toluene-sulfochloride and soda added. The reaction product is purified by solution in dilute caustic soda and precipitation with hydrochloric acid. This nitro body is now reduced with zinc dust and hydrochloric acid to the amino-sulfamide

LITERATURE.—Lange, *Zwischenprodukte*, #1801

Schultz-Heumann, *Anilinfarben*, 4, 2103

Ger. Pat. 135,016

Dyes Derived from *N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
92	MONOAZO DYE Metachrome Bordeaux R		Picramic Acid	M

**$\alpha$ -Amino-naphthalene**

*See,  $\alpha$ -Naphthylamine*

**$\beta$ -Amino-naphthalene**

*See,  $\beta$ -Naphthylamine*

**3-Amino-2:7-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, Amino-R Acid*

**4-Amino-1:5-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, 1-Naphthylamine-4:8-disulfonic Acid*

**4-Amino-1:6-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, 1-Naphthylamine-4:6-and-4:7-disulfonic Acids*

**4-Amino-1:7-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, 1-Naphthylamine-4:6-and-4:7-disulfonic Acids*

**4-Amino-2:7-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, Freund's Acid*

**5-Amino-1:3-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, 1-Naphthylamine-5:7-disulfonic Acid*

**6-Amino-1:3-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, 2-Naphthylamine-5:7-disulfonic Acid*

**7-Amino-1:3-naphthalene-disulfonic Acid (C. A. nomen.)**

*See, Amino-G Acid*

**8-Amino-1:6-naphthalene-disulfonic Acid (C. A. nomen.)**

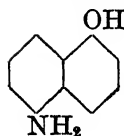
*See, 1-Naphthylamine-3:8-disulfonic Acid*

**1-Amino-naphthalene-4-sulfonic Acid**

*See, Naphthionic Acid*

**1-Amino-2-naphthalene-sulfonic Acid (C. A. nomen.)**

*See, 1-Naphthylamine-2-sulfonic Acid*

**2-Amino-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 2-Naphthylamine-1-sulfonic Acid**4-Amino-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, Naphthionic Acid**5-Amino-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, Laurent's Acid**5-Amino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 1-Naphthylamine-6-sulfonic Acid**5-and-8-Amino-2-naphthalene-sulfonic Acids** (*C. A. nomen.*)*See*, 1-Naphthylamine-6-and-7-sulfonic Acids**6-Amino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, Broenner's Acid**6-and-7-Amino-1-naphthalene-sulfonic Acids** (*C. A. nomen.*)*See*, 2-Naphthylamine-5-and-8-sulfonic Acids**7-Amino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 2-Naphthylamine-7-sulfonic Acid**8-Amino-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 1-Naphthylamine-8-sulfonic Acid**8-Amino-1:3:5-naphthalene-trisulfonic Acid** (*C. A. nomen.*)*See*, 1-Naphthylamine-4:6:8-trisulfonic Acid**8-Amino-1:3:6-naphthalene-trisulfonic Acid** (*C. A. nomen.*)*See*, 1-Naphthylamine-3:6:8-trisulfonic Acid**5-Amino-1-naphthol**

$$= \text{C}_{10}\text{H}_9\text{NO} = 159$$

FORMATION.—From 1-amino-naphthalene-5-sulfonic acid by fusion with caustic soda at 250°

LITERATURE.—Lange, Zwischenprodukte, #2335

**Dye Derived from 5-Amino-1-naphthol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
187	MONOAZO DYE Lanacyl Blue BB	I '14:—4,200	H Acid	A

**Amino-naphthol δ**

1-Amino-7-naphthol (*not considered herein*)

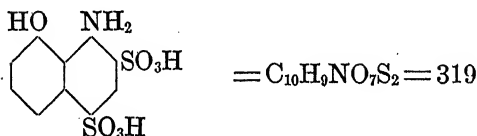
**1-Amino-8-naphthol-2:4-disulfonic Acid**

8-Amino-1-naphthol-5:7-disulfonic Acid (*C. A. nomen.*)

SS Acid or 2S Acid

Chicago Acid

Amino-naphthol-disulfonic Acid SS



STATISTICS.—Manufactured '19:—?

Manufactured '20:—?

FORMATION.—By caustic fusion at 180–190° of sodium 1:8-naphthasultam-2:4-disulfonate (anhydride of 1-amino-naphthalene-2:4:8-trisulfonic acid), which in turn is made from 1-naphthylamine-4:8-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 236

Lange, Zwischenprodukte, #2719

Thorpe, Dic. Chemistry, 3, 641

### Dyes Derived from 1-Amino-8-naphthol-2:4-disulfonic Acid

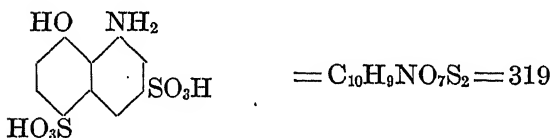
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
419	DISAZO DYES Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 150	Dianisidine $\beta$ -Naphthol	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1-Amino-8-naphthol- 4-sulfonic Acid	D
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20:— 7,480 M '20:— ?	Dianisidine 1-Amino-8-naphthol- 2:4-disulfonic Acid (2 mols)	D

### 1-Amino-8-naphthol-3:5-disulfonic Acid

8-Amino-1-naphthol-4:6-disulfonic Acid (*C. A. nomen.*)

Amino-naphthol-disulfonic Acid B

B Acid



FORMATION.—By sulfonation of 1-amino-8-naphthol-3-sulfonic acid

LITERATURE.—Amer. Pat. 606,437

Ger. Pat. A. F. 8626

**Dyes Derived from 1-Amino-8-naphthol-3:5-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
216	DISAZO DYES Domingo Blue Black B		Aniline <i>p</i> -Nitro-aniline	A
389	Eboli Blue B		Tolidine 1- Amino- 8- naphthol- 3: 5-disulfonic Acid (2 mols)	D
466	TRISAZO DYE Eboli Green CW		Benzidine Salicylic Acid Sulfanilic Acid	D

**1-Amino-8-naphthol-3:6-disulfonic Acid**

*See, H Acid*

**1-Amino-8-naphthol-4:6-disulfonic Acid**

*See, K Acid*

**2-Amino-8-naphthol-3:6-disulfonic Acid**

*See, 2R Acid*

**7-Amino-1-naphthol-3:6-disulfonic Acid (C. A. nomen.)**

*See, 2R Acid*

**8-Amino-1-naphthol-3:5-disulfonic Acid (C. A. nomen.)**

*See, K Acid*

**8-Amino-1-naphthol-3:6-disulfonic Acid (C. A. nomen.)**

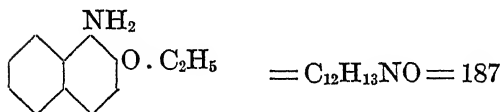
*See, H Acid*

**8-Amino-1-naphthol-4:6-disulfonic Acid (C. A. nomen.)**

*See, 1-Amino-8-naphthol-3:5-disulfonic Acid*

**8-Amino-1-naphthol-5:7-disulfonic Acid** (*C. A. nomen.*)*See*, 1-Amino-8-naphthol-2:4-disulfonic Acid**Amino-naphthol-disulfonic Acid B***See*, 1-Amino-8-Naphthol-3:5-disulfonic Acid**Amino-naphthol-disulfonic Acid H***See*, H Acid**Amino-naphthol-disulfonic Acid K***See*, K Acid**Amino-naphthol-disulfonic Acid RR***See*, 2R Acid**Amino-naphthol-disulfonic Acid SS***See*, 1-Amino-8-naphthol-2:4-disulfonic Acid**1-Amino-2-naphthol Ethyl Ether**

Naphthylamine Ether

2-Ethoxy-1-naphthylamine (*C. A. nomen.*)

FORMATION.—1-Nitro-2-naphthol ethyl ether is reduced in an alcoholic solution with iron turnings and hydrochloric acid

LITERATURE.—Lange, Zwischenprodukte, #2345, 2333

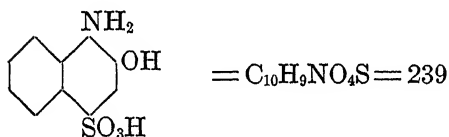


Dyes Derived from 1-Amino-2-naphthol Ethyl Ether

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
268	DISAZO DYE Naphthyl Blue Black N		1-Naphthylamine-4: 6- and 4: 7- disulfonic acids $\alpha$ - Naphthylamine	A
271	Diamine Blue 6 G		Amino-G acid $\beta$ -Naphthol	D

1-Amino-2-naphthol-4-sulfonic Acid (*C. A. nomen.*)

1: 2: 4 Acid



STATISTICS.—Manufactured '18:—169,999 lbs.

Manufactured '19:—837,384 lbs.

Manufactured '20:—971,370 lbs.

FORMATION.— $\beta$ -Naphthol is changed to the 1-nitroso- $\beta$ -naphthol, which is treated with sodium bisulfite. Upon acidification the free sulfurous acid effects simultaneous reduction and sulfonation

LITERATURE.—Cain, Intermediate Products (2d Ed.), 233

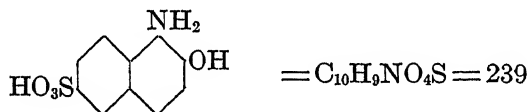
Lange, Zwischenprodukte, #2507

Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
29	MONOAZO DYES Eriochrome Red B	I '14:— 5,491	3-Methyl-1-phenyl-5-pyrazolone	ACr

**Dyes Derived from 1-Amino-2-naphthol-4-sulfonic Acid** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
180	MONOAZO DYES ( <i>continued</i> ) Erichrome Blue Black B	I '14:— 57,000	$\alpha$ -Naphthol	ACr
		M' 17:— 9,326		
		M' 18:— ?		
		M' 19:— ?		
		I '20:— 20,317		
		M' 20:— 29,255		
181	Palatine Chrome Black 6B Salicine Black	I '14:—248,721	$\beta$ -Naphthol	ACr
		M' 17:— ?		
		M' 18:—469,159		
		M' 19:—739,372		
		I '20:— 2,001		
		M' 20:— 1,074,248		

**1-Amino-2-naphthol-6-sulfonic Acid** (*C. A. nomen.*)

FORMATION.—Schaeffer's acid is treated with nitrous acid resulting in 1-nitroso-2-naphthol-6-sulfonic acid. This latter is reduced with zinc and hydrochloric acid

LITERATURE.—Meldola, Chem. Soc. Trans. **39**, 47 (1881)

Thorpe, Dic. Chemistry, **3**, 637

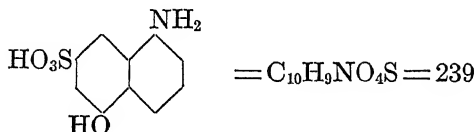
**Dye Derived from 1-Amino-2-naphthol-6-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
656	OXAZINE DYE Alizarin Green G	M' 19:— ?	1: 2-Naphthoquinone-4-sulfonic acid	M

**1-Amino-5-naphthol-7-sulfonic Acid**

5-Amino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

M Acid



FORMATION.—By fusing 1-naphthylamine-5:7-disulfonic acid with caustic soda at 160–220°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.) 234  
 Thorpe, *Dic. Chemistry*, 3, 638

**Dyes Derived from 1-Amino-5-naphthol-7-sulfonic Acid**

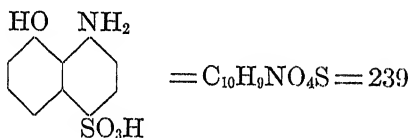
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
345	DISAZO DYES Oxamine Maroon		Benzidine Salicylic Acid	D
421	Oxamine Blue B	I '14:—35,891 I '20:— 13	Dianisidine Nevile-Winther's Acid	D

**1-Amino-8-naphthol-4-sulfonic Acid**

8-Amino-1-naphthol-5-sulfonic Acid (*C. A. nomen.*)

Amino-naphthol-sulfonic Acid S

S Acid



STATISTICS.—Manufactured '20:— ?

FORMATION.—By caustic soda fusion of 1-naphthylamine-4:8-disulfonic acid at 200–230°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 234

Thorpe, Dic. Chemistry, 3, 638

Lange, Zwischenprodukte, #2524 *et seq.*

**Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid**

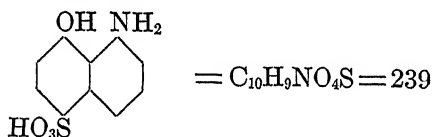
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
220	DISAZO DYES Palatine Black	I '14:—299,274 I '20:— 200	$\alpha$ -Naphthylamine Sulfanilic Acid	A
324	Chicago Blue 4R	I '14:— 1,199	Benzidine Croceine Acid	D
325	Columbia Blue R	I '14:— 3,071	Benzidine 1-Naphthol-3: 8-disul- fonic Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine H Acid	D
384	Chicago Blue 2R Diamine Blue C 2R	I '14:— 23,877	Tolidine Croceine Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Naphthol-3: 8-disul- fonic Acid	D
388	Chicago Blue R		Tolidine 1-Amino-8-naphthol- 4-sulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	Tolidine H Acid	D
420	Azidine Wool Blue B		Dianisidine Croceine Acid	D
422	Chicago Blue 4B	I '14:— 8,269	Dianisidine 1-Amino-8-naphthol- 2: 4-disulfonic Acid	D

**Dyes Derived from 1-Amino-8-naphthol-4-sulfonic Acid** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
423	DISAZO DYES ( <i>continued</i> ) Chicago Blue B	M '18:— ?	Dianisidine 1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	Dianisidine H Acid	D
465	TRISAZO DYE Columbia Black Green D		Ben-zidine Salicylic Acid Aniline	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Ben-zidine Salicylic Acid Sulfanilic Acid	D

**1-Amino-8-naphthol-5-sulfonic Acid**

8-Amino-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)



FORMATION.—By heating 1-naphthylamine-5:8-disulfonic acid with 75 per cent caustic potash at about 150°

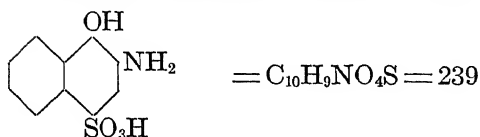
LITERATURE.—Ger. Pat. 75,055

Thorpe, *Dic. Chemistry*, 3, 639

Lange, *Zwischenprodukte*, #2450

**Dye Derived from 1-Amino-8-naphthol-5-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
218	DISAZO DYE Nigrophor BASF		<i>p</i> -Nitro-aniline 2:5-Dichloro-aniline	MF

**2-Amino-1-naphthol-4-sulfonic Acid**

FORMATION.—By heating 2-nitroso-1-naphthol with 35 per cent sodium bisulfite solution

LITERATURE.—Schmidt, J. pr. Chem [II], **44**, 531 (1891)  
 Thorpe, Dic. Chemistry, **3**, 639

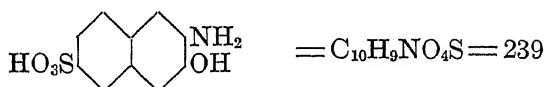
**Dye Derived from 2-Amino-1-naphthol-4-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
657	OXAZINE DYE Alizarine Green B	I '14:—551	1: 2-Naphthoquinone-4-sulfonic Acid	M

**2-Amino-3-naphthol-6-sulfonic Acid**

Amino-naphthol-sulfonic Acid R

3-Amino-2-naphthol-7-sulfonic Acid (*C. A. nomen.*)



FORMATION.—From Amino-R acid (2-naphthylamine-3: 6-disulfonic acid) by caustic soda fusion at 240°

LITERATURE.—Lange, Zwischenprodukte, #2534  
 Thorpe, Dic. Chemistry, **3**, 639

**Dye Derived from 2-Amino-3-naphthol-6-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
185	MONOAZO DYE Anthracene Chrome Black	I '14:—51,577 I '20:— 2,339	$\beta$ -Naphthol	M

**2-Amino-5-naphthol-7-sulfonic Acid**

*See, J Acid*

**2-Amino-8-naphthol-6-sulfonic Acid**

*See, Gamma Acid*

**3-Amino-2-naphthol-7-sulfonic Acid (C. A. nomen.)**

*See, 2-Amino-3-naphthol-6-sulfonic Acid*

**5-Amino-1-naphthol-3-sulfonic Acid (C. A. nomen.)**

*See, 1-Amino-5-naphthol-7-sulfonic Acid*

**6-Amino-1-naphthol-3-sulfonic Acid (C. A. nomen.)**

*See, J Acid*

**7-Amino-1-naphthol-3-sulfonic Acid (C. A. nomen.)**

*See, Gamma Acid*

**8-Amino-1-naphthol-4-sulfonic Acid (C. A. nomen.)**

*See, 1-Amino-8-naphthol-5-sulfonic Acid*

**8-Amino-1-naphthol-5-sulfonic Acid (C. A. nomen.)**

*See, 1-Amino-8-naphthol-4-sulfonic Acid*

**Amino-naphthol-sulfonic Acid G**

*See, Gamma Acid*

**Amino-naphthol-sulfonic Acid J**

*See, J Acid*

**Amino-naphthol-sulfonic Acid R**

*See, 2-Amino-3-naphthol-6-sulfonic Acid*

**Amino-naphthol-sulfonic Acid S**

*See, 1-Amino-8-naphthol-4-sulfonic Acid*

**Amino-naphthol-sulfonic Acid  $\gamma$**

*See, Gamma Acid*

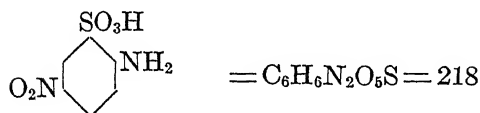
*p*-(2-Amino-4-nitro-anilino)-phenol (*C. A. nomen.*)

*See*, 2-Amino-4'-hydroxy-4-nitro-diphenylamine

**2-Amino-5-nitro-benzene-sulfonic Acid** (*C. A. nomen.*  $\text{SO}_3\text{H} = 1$ )

*p*-Nitro-aniline-*o*-sulfonic Acid ( $\text{NH}_2 = 1$ )

4-Nitro-aniline-2-sulfonic Acid ( $\text{NH}_2 = 1$ )



STATISTICS.—Manufactured 1918; amount not disclosed

FORMATION.—2-Chloro-5-nitro-benzene-sulfonic acid (by oleum sulfonation of *p*-chloro-nitro-benzene) is heated in an autoclave at 120–140° with alcoholic ammonia

LITERATURE.—Cain, Intermediate Products (2d Ed.), 56

### Dyes Derived from 2-Amino-5-nitro-benzene-sulfonic Acid

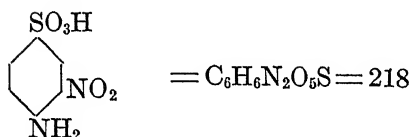
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
132	MONOAZO DYES Lake Red P	I '14:—60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	$\beta$ -Naphthol	CL
133	Eriochrome Phosphine R	I '14:— 1,433	Salicylic Acid	ACr
458	TRISAZO DYES Carbon Black		1-Naphthylamine-6- or-7-sulfonic Acid <i>m</i> -Phenylene-diamine or <i>m</i> -Tolylene-dia- mine or 1:3-Naph- thylene-diamine-6- sulfonic Acid	D



**4-Amino-3-nitro-benzene-sulfonic Acid** (*C. A. nomen.*)

*o*-Nitro-aniline-*p*-sulfonic Acid ( $NH_2=1$ )

2-Nitro-aniline-4-sulfonic Acid ( $NH_2=1$ )



STATISTICS.—Manufactured '17:— ?

FORMATION.—From chloro-benzene-*p*-sulfonic acid by nitration, followed by amidation with ammonia

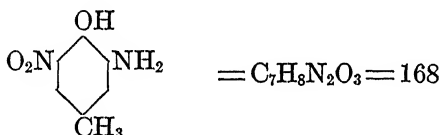
LITERATURE.—Ullmann, Enzy. tech. Chemie, **1**, 443

**Dye Derived from 4-Amino-3-nitro-benzene-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
148	MONOAZO DYE Fast Orange O	I '14:—1,250 M '17:— ?	$\beta$ -Naphthol	CL

**2-Amino-6-nitro-*p*-cresol** (*C. A. nomen.*  $OH=1$ )

*o*-Nitro-*o*-amino-*p*-cresol



FORMATION.—The above cresol derivative is obtained by partially reducing the 2:6-dinitro-*p*-cresol. This latter results either from the direct dinitration of *p*-cresol; or by the dinitration of *p*-toluidine, and subsequent hydrolysis with alkali

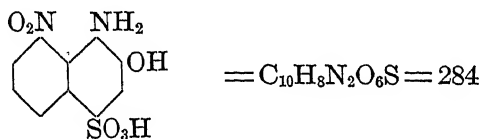
LITERATURE.—Ber. **15**, 1859

Dye Derived from 2-Amino-6-nitro-*p*-cresol (*OH* = 1)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
85	MONOAZO DYE Omega Chrome Black PV		Phenyl-1-naphthyl- amine-8-sulfonic Acid	ACr

## 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

Nitro-1: 2: 4 Acid



FORMATION.—From 1-amino-2-naphthol-4-sulfonic Acid by nitration

LITERATURE.—Lange, Zwischenprodukte, #2688

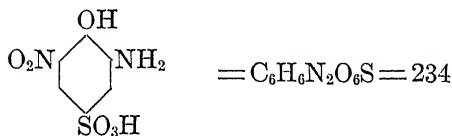
## Dyes Derived from 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
183	MONAZO DYES Eriochrome Black T	I '14:—129,550 M '18:— ? M '19:— ? I '20:—2,624 M '20:— ?	$\alpha$ -Naphthol	ACr
184	Eriochrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,710 I '20:— 14,262 M '20:— ?	$\beta$ -Naphthol	ACr

2-Amino-6-nitro-1-*p*-phenol-4-sulfonic Acid (*C. A. nomen. OH* = 1)

6-Nitro-2-amino-phenol-4-sulfonic Acid

2-Nitro-6-amino-phenol-4-sulfonic Acid



FORMATION.—From phenol by sulfonation, dinitration and partial reduction with sodium sulfide

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 129  
Lange, *Zwischenprodukte*, #1130

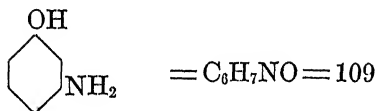
**Dye Derived from 2-Amino-6-nitro-phenol-4-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
159	MONOAZO DYE Acid Alizarin Black R	I '14:—16,800 M '19:— ? I '20:— 439 M '20:— ?	$\beta$ -Naphthol	M

**6-Amino-5-nitroso-2-naphthalene-sulfonic Acid (*C. A. nomen.*)**

*See*, 1-Nitroso-2-naphthylamine-6-sulfonic Acid

***m*-Amino-phenol**



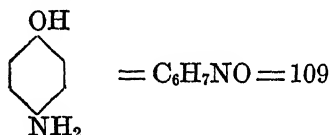
FORMATION.—By the fusion of Metanilic Acid (3-amino-benzene-sulfonic acid) with caustic soda at about 280–290°

LITERATURE.—Ber. **32**, 2112–2124

Lange, *Zwischenprodukte*, #582–584

Dyes Derived from *m*-Amino-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
90	MONOAZO DYE Chrome Brown P		Picramic Acid	M
923	ANILINE BLACK GROUP Fuscamine	I '14:— 54,005 M '19:— ? I '20:— 1,600 (M '20:—168,459)	<i>m</i> -Amino-phenol (x mols) [Oxidation on hair]	Fur

*p*-Amino-phenol

STATISTICS.—Imported '14:— 10,631 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:—113,428 lbs.  
 Manufactured '19:—128,627 lbs.  
 Manufactured '20:— 41,474 lbs.

FORMATION.—Phenol is treated with sodium nitrite in the cold and the resulting *p*-nitroso-phenol is reduced with sodium sulfide

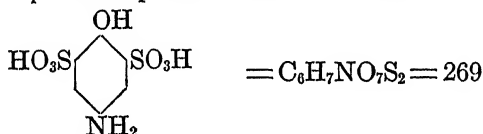
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 117  
 Lange, *Zwischenprodukte*, #585–589

Dyes Derived from *p*-Amino-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
14	STILBENE DYE Diphenyl Chrysoine	I '14:— 9,898	<i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid (2 mols)	D
84	MONOAZO DYE Azo Chromine		Pyrogallol	M

Dyes Derived from *p*-Amino-phenol (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
SULFUR DYES				
709	Italian Green	I '14:— 298 M '18:— ? I '20:— 2,603	[Sulfur, etc.]	S
717	Vidal Black I	I '14:— 7,495	[Na <sub>2</sub> S+S]	S
724	Immedial Black	I '14:— 54,696 M '18:— ?	1-Chloro-2: 4-dinitro-benzene [S+Na <sub>2</sub> S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	1-Chloro-2: 4-dinitro-benzene [NaOH; S+Na <sub>2</sub> S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	1-Chloro-2: 4-dinitro-benzene [Alcohol; S + Na <sub>2</sub> S]	S
733	Immedial Indone	I '14:— 4,236	<i>o</i> -Toluidine [S+Na <sub>2</sub> S]	S
734	Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	<i>p</i> -Nitro-benzyl chloride	S
ANILINE BLACK GROUP				
923	Ursol P	I '14:— 54,005 M '19:— ? I '20:— 1,600 M '20:— 168,459	<i>p</i> -Amino-phenol (x mols) [Oxidation]	Fur

4-Amino-1-phenol-2: 6-disulfonic Acid (*OH*=1) (*C. A. nomen.*)*p*-Amino-phenol-*a*-disulfonic Acid

*Note.*—Position of the sulfonic groups not fully established.

FORMATION.—Nitroso-dimethyl-aniline hydrochloride or nitroso-phenol is introduced into a solution of sodium bisulfite, and warmed to effect solution. Then concentrated hydrochloric is added and the liquor boiled for two hours, using direct steam

LITERATURE.—Ger. Pat. 65,236

Beil. spl. II, 492

Lange, Zwischenprodukte, #1154

**Dye Derived from 4-Amino-1-phenol-2: 6-disulfonic Acid**

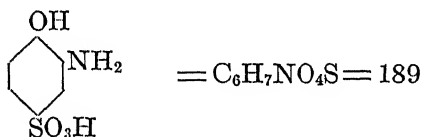
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
158	MONOAZO DYE Chrome Brown RR	I '14:—7,241 M '17:— ? I '20:—2,183	Pyrogallol	M

***p*-Amino-phenol Ethyl Ether**

*See, p*-Phenetidine

**2-Amino-1-phenol-4-sulfonic Acid** (*C. A. nomen. OH=1*)

*o*-Amino-phenol-*p*-sulfonic Acid



STATISTICS.—Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—Chloro-benzene is sulfonated and nitrated. The chloro-body is then hydrolyzed to the phenol by boiling with caustic soda, and finally reduced to 2-amino-phenol-4-sulfonic acid by means of sodium sulfide

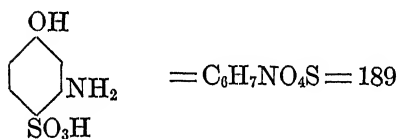
LITERATURE.—Cain, Intermediate Products (2d Ed.), 129

## Dyes Derived from 2-Amino-1-phenol-4-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
154	MONOAZO DYES			
	Acid Alizarin	I '14:— 18,264	<i>m</i> -Phenylenc-diamine	M
	Brown B	M '17:— ?		
	Palatine Chrome	M '18:— ?		
	Brown W	M '19:— ?		
		I '20:— 845		
		M '20:— ?		
155	Acid Alizarin	I '20:— 201	Resorcinol	M
	Garnet R	M '20:— ?		
156	Acid Alizarin	I '14:— 1,199	$\beta$ -Naphthol	ACr
	Violet N	M '19:— ?		
	Palatine Chrome	M '20:— ?		
	Violet			
157	Diamond Black PV	I '14:— 285,074	1: 5-Dihydroxy-naphthalene	M
		M '20:— ?		

3-Amino-1-phenol-4-sulfonic Acid (*C. A. nomen. OH=1.*)

## Amino-phenol-sulfonic Acid III



FORMATION.—By fusion with caustic soda of the aniline-disulfonic acid prepared by sulfonation of metanilic acid.

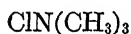
*Note.*—Amino-phenol-sulfonic acid III is not 5-amino-phenol-2-sulfonic acid

LITERATURE.—Ber. **39**, 3345

Lange, Zwischenprodukte, #942

## Dyes Derived from 3-Amino-1-phenol-4-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
339	DISAZO DYE Brilliant Orange G	I '14:—6,321 M '17:— ?	Benzidine Salicylic Acid	D
481	TRISAZO DYE Azo Corinth		Tolidine Naphthionic Acid Resorcinol	D

***o*-Amino-phenol-*p*-sulfonic Acid***See*, 2-Amino-1-phenol-4-sulfonic Acid**Amino-phenol-sulfonic Acid III***See*, 3-Amino-1-phenol-4-sulfonic Acid (OH = 1)**Amino-phenol-sulfonic Acid IV**3-Amino-1-phenol-6-sulfonic Acid (*not considered herein*)**Amino-phenol-sulfonic Acid V**3-Amino-1-phenol-5-sulfonic Acid (*not considered herein*)***p*-(*p*-Amino-phenyl-azo)-benzene-sulfonic Acid***See*, Amino-azo-benzene-sulfonic Acid**1-(*p*-Amino-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)***See*, Dehydro-thio-*p*-toluidine**IV-Amino-2-phenyl-5-methyl-thiazol***See*, Dehydro-thio-*p*-toluidine***p*-Amino-phenyl-toluthiazole***See*, Dehydro-thio-*p*-toluidine**(*m*-Amino-phenyl)-trimethyl-ammonium Chloride**Trimethyl-*m*-amino-phenyl-ammonium chloride



FORMATION.—*m*-Nitro-aniline by heating in methanol (methyl alcohol) solution, with hydrochloric acid is transformed into *m*-nitro-phenyl-trimethyl-ammonium chloride (and *m*-nitro-dimethyl-aniline). The *m*-nitro-phenyl-trimethyl-ammonium chloride is dissolved in water and reduced with zinc dust and hydrochloric acid

LITERATURE.—Lange, Zwischenprodukte, #549,564

Green, Organic Coloring Matters (1908), 12

**Dyes Derived from (*m*-Amino-phenyl)-trimethyl-ammonium Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
60	MONOAZO DYE Azo Phosphine GO	I '14:— 50	Resorcinol	B
222	DISAZO DYES Janus Yellow G	I '14:—2,250 I '20:— 758	Resorcinol <i>m</i> -Nitro-aniline	B
240	Janus Red B	I '14:— 250 I '20:— 176	<i>m</i> -Toluidine $\beta$ -Naphthol	B
435	TRISAZO DYE Janus Brown B		$\alpha$ -Naphthylamine or <i>m</i> -Toluidine Aniline <i>m</i> -Phenylene-diamine	B

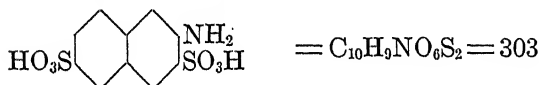
**Amino-R Acid**

2-Naphthylamine-3:6-disulfonic Acid

$\beta$ -Naphthylamine-disulfonic Acid R

$\beta$ -Naphthylamine- $\alpha$ -disulfonic Acid

3-Amino-2:7-naphthalene-disulfonic Acid (*C. A. nomen.*)



FORMATION.—By heating R salt with ammonia in an autoclave, in presence of ammonium bisulfite

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207

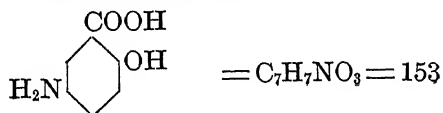
Lange, Zwischenprodukte, #2594

Thorpe, Dic. Chemistry, 3, 604

## Dyes Derived from Amino-R Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
120	MONOAZO DYE Salmon Red	M '20:— ?	Dehydro-thio- <i>m</i> -xyli- dine	D
314	DISAZO DYES Pyramine Orange 2R	I '14:— 2,789	Benzidine Nitro- <i>m</i> -phenylene- diamine	D
315	Congo Orange R	I '14:— 1,623 I '20:— 75	Benzidine Phenol [Ethylation]	D
316	Brilliant Congo G		Benzidine Broenner's Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Gamma Acid	D
358	Brilliant Dianol Red R Diphenyl Red	I '14:—14,305 I '20:— 3,704	Dichloro-benzidine Amino-R Acid (2 mols)	D
359	Trypan Red		Benzidine-sulfonic Acid Amino-R Acid (2 mols)	Medi- cinal
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Naphthionic Acid	D
370	Brilliant Congo R	I '14:—19,133 I '20:—11,129	Tolidine Broenner's Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Phenol [Ethylation]	D

## 5-Amino-salicylic Acid



STATISTICS.—Imported '14:— 9,188 lbs.

Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:—37,769 lbs.

Manufactured '20:— ?

FORMATION.—(1) From the corresponding nitro-salicylic acid by reduction. (2) By reducing the azo-dye, benzene-azo-salicylic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 150

**Dyes Derived from 5-Amino-salicylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
275	DISAZO DYES Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	$\alpha$ -Naphthylamine Nevile-Winther Acid or 1-naphthol-5-sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,016	$\alpha$ -Naphthylamine 1: 8-Dihydroxy-naph- thalene- 4- sulfonic Acid	ACr
277	Anthracene Acid Black DSF	I '14:— 17,793	1-Naphthylamine-6- and 7-sulfonic Acids, etc.	M
492	TETRAKISAZO DYE Anthracene Acid Brown B		1-Naphthylamine-6-sul- fonic Acid (2 mols) <i>m</i> -Phenylene-diamine Amino-salicylic Acid (2 mols)	M ACr
550	TRIPHENYL-METHANE DYE Chrome Bordeaux		Hydrol [Oxidation]	M

**Amino-Schaeffer's Acid**

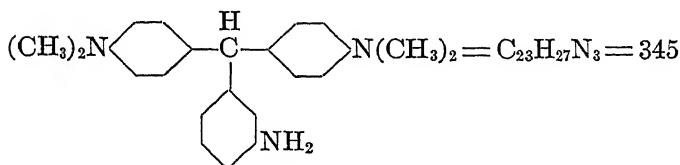
See, Broenner's Acid

**1-(4-Amino-?-sulfo-phenyl)-5-methyl-benzothiazole** (*C. A. nomen.*)  
*See, Dehydro-thio-p-toluidine-sulfonic Acid*

**4-Amino-4: 5-sultam-1: 3: 5-naphthalene-trisulfonic Acid** (*C. A. nomen.*)

*See, 1: 8-Naphthasultam-2: 4-disulfonic Acid*

***m*-Amino-tetramethyl-*p*': *p*''-diamino-triphenyl-methane**  
*N*': *N*'': *N*''-Tetramethyl-*m*: *p*': *p*''-methenyl-trisaniline (*C. A. nomen.*)



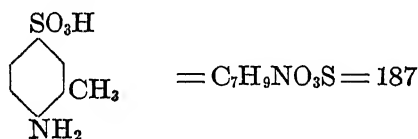
**FORMATION.**—*m*-Nitro-benzaldehyde and dimethyl-aniline are condensed in the presence of acids or zinc chloride to *m*-nitro-tetramethyl-*p*: *p*-diamino-triphenyl-methane, which by reduction gives the *m*-amino-derivative

**LITERATURE.**—Schultz, *Chemie Steinkohlenteers* (3 auf.), 1, 115, 116.

**Dye Derived from *m*-Amino-tetramethyl-*p*': *p*''-diamino-triphenyl-methane**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
510	TRIPHENYL-METHANE DYE Azo Green		Salicylic Acid	M

**4-Amino-*m*-toluene-sulfonic Acid** (*C. A. nomen. SO<sub>3</sub>H* = 1)  
*o*-Toluidine-*m*-sulfonic Acid (CH<sub>3</sub> = 1)



FORMATION.—From *o*-toluidine acid sulfate by heating in an oven

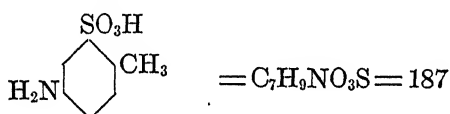
LITERATURE.—Cain, Intermediate Products (2d Ed.), 57

**Dyes Derived from 4-Amino-*m*-toluene-sulfonic Acid ( $SO_3H=1$ )**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
24	PYRAZOLONE DYE Pigment Fast Yellow R		3-Methyl-1-phenyl-5-pyrazolone	CL
151	MONOAZO DYE Orange RO, T	I '14:—90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	$\beta$ -Naphthol	A

**5-Amino-*o*-toluene-sulfonic Acid (*C. A. nomen.*  $SO_3H=1$ )**

*p*-Toluidine-*o*-sulfonic Acid ( $CH_3=1$ )



STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-toluidine sulfate by heating in oven (baking process)

LITERATURE.—Green, Organic Coloring Matters (1908), 22

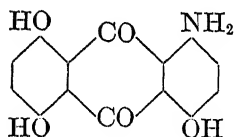
Lange, Zwischenprodukte, #839,237

**Dyes Derived from 5-Amino-*o*-toluene-sulfonic Acid ( $SO_3H=1$ )**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
150	MONOAZO DYES Fast Yellow N		Diphenylamine	A
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	3-Hydroxy-2-naphthoic Acid	CL

Dyes Derived from 5-Amino-*o*-toluene-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
852	ANTHRAQUINONE AND ALLIED DYES Alizarin Direct Violet R	I '20:— 251	Quinizarin	A
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— ?	Quinizarin <i>p</i> -Toluidine-3-sulfonic Acid (2 mols)	ACr

**3'-Amino-(*p*-toluene-sulfo)-*p*-toluide** (*C. A. nomen.*)*See, N*-(3-Amino-4-methyl-phenyl)-*p*-toluene-sulfamide**4-(4-Amino-*m*-tolyl-azo)-*m*-toluene-sulfonic Acid** (*C. A. nomen.*)*See, o*-Amino-azo-toluene-sulfonic Acid**1-(4-Amino-*m*-tolyl)-3:5-dimethyl-benzothiazole** (*C. A. nomen.*)*See, Dehydro-thio-m*-xylidine**1-(6-Amino-*m*-tolyl)-3:5-dimethyl-benzothiazole** (*C. A. nomen.*)*See, iso-Dehydro-thio-m*-xylidine**1-Amino-4:5:8-trihydroxy-anthraquinone**8-Amino-1:4:5-trihydroxy-anthraquinone (*C. A. nomen.*)

FORMATION.—4:8-Dinitro-anthrarufin (*p*-dinitro-anthrarufin) is heated with sulfuric and boric acids at temperature of water bath, forming 1-nitro-4:5:8-trihydroxy-anthraquinone. (At higher temperatures the 1:4:5:8-tetrahydroxy-anthraquinone is formed.) By reduction of the 1-nitro-derivative, the desired amino-derivative results.

LITERATURE.—Ger. Pat. 125,579; Frdl. 6, 335; Chem. Zen. 1901, II, 1189

**Dye Derived from 1-Amino-4: 5: 8-trihydroxy-anthraquinone**

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
823	ANTHRAQUINONE AND ALLIED DYES Algol Violet B	I '20:—69	Benzoyl chloride	V

**Andresen's Acid**

See, 1-Naphthol-3: 8-disulfonic Acid

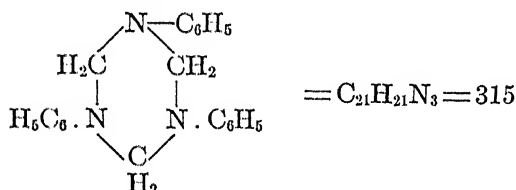
This trivial name also applied to:—

2-Naphthylamine-4: 7-disulfonic Acid

**Anhydro-formaldehyde-aniline**

1: 3: 5-Triphenyl-hexahydro-s-triazine (*C. A. nomen.*)

Formaniline



Note.—Some of the older books give the formula as  $\text{C}_6\text{H}_5\text{N}:\text{CH}_2$

STATISTICS.—Manufactured 1920, but in an undisclosed amount.

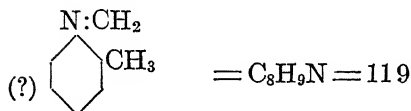
FORMATION.—By condensation of aniline and formaldehyde

LITERATURE.—Beilstein, Organische Chemie (3d auf.), 2, spl. 233

Cain and Thorpe, Synthetic Dyestuffs, 90

**Dye Derived from Anhydro-formaldehyde-aniline**

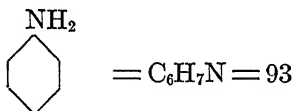
Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
511	TRIPHENYL-METHANE DYE Parafuchsine Paramagenta	M '14:—65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline Aniline hydrochloride [Nitro-benzene and ferrie chloride]	B

**Anhydro-formaldehyde-*o*-toluidine**

FORMATION.—By condensation of *o*-toluidine and formaldehyde

**Dyes Derived from Anhydro-formaldehyde-*o*-toluidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Applica- tion Class</i>
513	TRIPHENYL-METHANE DYE New Fuchsine O	I '14:—300 M '18:— ? M '19:— ? M '20:— ?	<i>o</i> -Toluidine <i>o</i> -Toluidine hydrochloride [ <i>o</i> -Nitro-toluene and ferrous chloride]	B

**Aniline**

STATISTICS.—Imported '14:— 4,553,028 lbs.  
 Manufactured '17:—30,149,397 lbs.  
 Manufactured '18:—25,867,488 lbs.  
 Manufactured '19:—25,792,695 lbs.  
 Manufactured '20:—41,259,142 lbs.

FORMATION.—Benzene is nitrated to nitro-benzene with mixed nitric and sulfuric acid. The nitro-benzene is reduced to aniline with iron turnings and hydrochloric acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 40  
 Lange, *Zwischenprodukte*, #69–82



Dyes Derived from Aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
12	STILBENE DYE Diphenyl Citronine G		Aniline (2 mols) Dinitro-dibenzyl- disulfonic Acid or Dinitro-distilbene- disulfonic Acid or <i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols)	D
19	PYRAZOLONE DYES Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	3-Methyl-1- <i>p</i> -sulfo- phenyl-5-pyrazolone or Phenyl-hydrazine- <i>p</i> - sulfonic Acid Aceto-acetic Ethyl Ester	A
20	Flavazine S	I '14:— 81,375 I '20:— 1,500	1- <i>p</i> -Sulfophenyl-5- pyrazolone-3-car- boxylic Acid or Phenyl-hydrazine- <i>p</i> - sulfonic Acid Oxal-acetic Ester	A
31	MONOAZO DYES Amino-azo-benzene Spirit Yellow	M '17:— ? M '18:— 52,283 M '19:— ? M '20:— ?	Aniline (2 mols)	ss
32	Butter Yellow Oil Yellow	I '14:— 4,062 M '17:— 33,180 M '18:— 27,669 M '19:— 31,156 M '20:— 74,182	Dimethyl-aniline	ss
33	Chrysoidine	I '14:— 63,303 M '17:— 195,756 M '18:— 376,495 M '19:— 314,581 M '20:— 585,648	<i>m</i> -Phenylene-diamine	B

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
34	Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 M '20:—186,793 I '20:— 1,102	<i>m</i> -Tolylene-diamine	B
35	Sudan G	I '14:— 798	Resorcinol	ss
36	Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:—116,624	$\beta$ -Naphthol	ss
37	Ponceau 4 GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Schaeffer's Acid	A
38	Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? M '20:—120,874 I '20:— 100	G Acid	A
39	Ponceau G	M '17:— ? M '19:— ?	R Acid	A
40	Chromotrope 2R	I '14:— 5,000 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	A
41	Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	H Acid	A

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
42	Amido Naphthol Red G	I '14:— 3,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,028 M '20:—132,637	Acetyl-H Acid	A
43	Tolane Red B, G		K Acid	A
44	Azo Archil R		2 R Acid	A
45	Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	3-Hydroxy-2-naphthoic Acid	CL
58	Alizarin Yellow R	I '14:— 97,057 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid [Nitration]	M
124	Diazine Green S	I '14:— 1,340	<i>o</i> -Toluidine <i>p</i> -Tolylene-diamine [or Safranine] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	<i>o</i> -Toluidine <i>p</i> -Tolylene-diamine [or Safranine] Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	<i>o</i> -Toluidine <i>p</i> -Tolylene-diamine [or Safranine] $\beta$ -Naphthol	B
127	Methyl Indone B	M '17:— ?	<i>o</i> -Toluidine <i>p</i> -Tolylene-diamine [or Safranine] ["Amino-naphthols"]	B

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
128	Janus Gray B		<i>o</i> -Toluidine <i>p</i> -Tolylene-diamine [ <i>or</i> Safranine], etc.	B
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Benzene- ( <i>or</i> Toluene-) sulfonyl Chloride	A
	DISAZO DYES			
215	Blue Black N	I '14:— 2,653	K Acid <i>p</i> -Nitro-aniline	A
216	Domingo Blue Black B		1-Amino-8-naphthol- 3: 5-disulfonic Acid <i>p</i> -Nitro-aniline	A
217	Naphthol Blue Black	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 340 M '20:— 2,608,864	H Acid <i>p</i> -Nitro-aniline	A
219	Chrome Patent Green N		K Acid Picramic Acid	ACr
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	$\alpha$ -Naphthylamine Gamma Acid	D
242	Sulfone Black G		1-Naphthylamine-6- <i>and</i> 7-sulfonic Acid 1: 8-Dihydroxy-naphth- alene-4-sulfonic Acid	A
270	Brilliant Croceine 9B		Amino-G Acid R <i>and</i> G Acids	A

Dyes Derived from Aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
279	Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid Phosgene	D
435	TRISAZO DYES Janus Brown B		Trimethyl- <i>m</i> -amino- phenyl-ammonium chloride or <i>p</i> -Amino- benzyl-diethylamine <i>α</i> -Naphthylamine or <i>m</i> -Toluidine <i>m</i> -Phenylene-diamine	B
444	Crumpsall Direct Fast Brown B		Benzidine Salicylic Acid Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Phenyl-gamma Acid	D
462	Erie Direct Black GX Direct Deep Black E, EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine H Acid <i>m</i> -Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine H Acid <i>m</i> -Tolylenc-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Phenol	D
465	Columbia Black Green D		Benzidine Salicylic Acid 1-Amino-8-Naphthol- 4-sulfonic Acid	D

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
482	TRISAZO DYES ( <i>continued</i> ) Alizarin Yellow FS		<i>o</i> -Toluidine and <i>p</i> -Toluidine [or Fuchsine] Salicylic Acid (3 mols)	M
511	TRIPHENYL-METHANE DYES Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	<i>p</i> -Toluidine Aniline (2 mols) [Iron and nitro-benzene or arsenic Acid] <i>or</i> <i>p</i> -Nitro-benzaldehyde Aniline sulfate (2 mols) [Zinc chloride; ferrous chloride] <i>or</i> <i>p</i> : <i>p</i> 'Diamino-diphenyl- methane <i>or</i> anhydro- formaldehyde-aniline [Nitro-benzene and fer- ric chloride]	B
512	Fuchsine Magenta	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:— 155,830 I '20:— 189 M '20:— 284,285	<i>p</i> -Toluidine <i>o</i> -Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	[Magenta methylated or ethylated] <i>or</i> <i>o</i> -Toluidine <i>p</i> -Toluidine [Nitro-benzene, iron and zinc chloride or arsenic acid] [Methylation or ethyl- ation]	B

Dyes Derived from Aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES (continued)			
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	[Para-rosaniline tri- phenylated] or Aniline (5 mols) <i>p</i> -Toluidine [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	[Magenta phenylated] or Aniline (2-4 mols) <i>o</i> -Toluidine <i>p</i> -Toluidine [Benzoic Acid]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	[Magenta sulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine [sulfonation]	A
525	Red Violet [5RS]		[Magenta ethylated and sulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine [Ethylation and sulfonation]	A
526	Acid Violet [4RS]		[Magenta dimethylated, trisulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine [Dimethylation, Tri- sulfonation]	A
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	[Triphenyl- <i>p</i> -rosaniline sulfonated] or <i>p</i> -Toluidine Aniline (5 mols) [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	[Spirit Blue or Triphenyl- <i>p</i> -rosaniline+di- phenyl-rosoaniline sulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine Aniline (3-5 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue B	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	[Triphenyl- <i>p</i> -rosaniline mono- and di-sulfo- nated] or <i>o</i> -Toluidine <i>p</i> -Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	[Triphenyl- <i>p</i> -rosaniline di- and tri-sulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine Aniline (4 mols) [Di- and Tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	[Spirit Blue or Tri- phenyl- <i>p</i> -rosaniline+ diphenyl-rosoaniline di- and tri-sulfonated] or <i>o</i> -Toluidine <i>p</i> -Toluidine Aniline (3-5 mols) [Di- and tri-sulfonation]	A



Dyes Derived from Aniline (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
540	TRIPHENYL-METHANE DYES (continued) Pacific Blue		[ <i>p</i> -Rosaniline + diamino- diphenyl-methane and sulfonation] or <i>o</i> -Toluidine <i>p</i> -Toluidine Diamino-diphenyl- methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		[ $\beta$ -Naphthyl-rosaniline sulfonated] or $\beta$ -Naphthylamine (3 mols) <i>o</i> -Toluidine <i>p</i> -Toluidine [Disulfonation]	B
572	XANTHONE DYES Rhodamine G	I '14:— 2,648 I '20:— 517	[Rhodamine B heated with aniline to re- move one C <sub>2</sub> H <sub>5</sub> group] or Phthalic anhydride Diethyl- <i>m</i> -amino- phenol (2 mols)	B
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	[Dichloro-fluoresceine and aniline or <i>p</i> -tol- uidine; sulfonation] or Aniline (2 mols) Phthalic Anhydride Resorcinol [PCl <sub>5</sub> ; Sulfonation]	A
606	ACRIDINE DYE Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	[Magenta by-product] or <i>p</i> -Toluidine <i>o</i> -Toluidine	B

## Dyes Derived from Aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
622	OXAZINE DYES Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 I '20:— 29,643 M '20:— 76,719	Nitroso-dimethyl- aniline Gallic Acid [Sulfonation] or [Gallocyanine treated with aniline; Sulfo- nation]	M
630	Cyanazurine		Nitroso-dimethyl- aniline Gallamide [Reduction]	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Nitroso-dimethyl- aniline	M
646	Coreine AR		Gallamide Nitroso-diethyl-aniline or Diethyl-amino- azo- benzene [Sulfonation] or [Coreine RR; Sulfona- tion]	M
672	AZINE DYES Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) $\alpha$ -Naphthylamine [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) $\alpha$ -Naphthylamine [Trisulfonation]	A

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	AZINE DYES ( <i>continued</i> )			
674	Rosinduline 2G	I '20:— 201	Aniline <sup>-</sup> (3 <sup>7</sup> mols) $\alpha$ -Naphthylamine [Trisulfonation; heated to 160°]	A
675	Rosinduline G	I '20:— 40	Aniline (2 mols) 1-Nitroso-2-naphthyl- amine-6-sulfonic Acid	A
679	Safranine	I '14:— 59,921 M '17:— ? M '18:— 106,591 M '19:— 131,042 I '20:— 386 M '20:— 149,629	<i>p</i> -Tolylene-diamine <i>o</i> -Toluidine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) Dimethyl- <i>p</i> -phenylene- diamine [Oxidation]	B
682	Nigramine		Nitroso-dimethyl- aniline	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl- <i>p</i> -phenylene- diamine <i>o</i> - or <i>p</i> -Toluidine [Oxidation]	B
684	Brilliant Rhoduline Red		N <sup>3</sup> -Ethyl-4- <i>m</i> -tolylene- diamine Methyl- <i>o</i> -toluidine	B
686	Amethyst Violet		Diethyl- <i>p</i> -phenylene- diamine Diethyl-aniline [Oxidation]	A

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	AZINE DYES ( <i>continued</i> )			
687	Rosolane O	I '20:— 1,083	<i>p</i> -Amino-diphenyl- amine <i>o</i> -Toluidine [Oxidation]	B
688	Rosolane Mauve	I '14:— 796 I '20:— 3	Toluidines (3 mols) [Oxidation]	B
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) $\alpha$ -Naphthylamine (2 mols) [Sulfonation] <i>or</i> Aniline (2 mols) Phenyl- $\alpha$ -naphthyl- amine (2 mols) Phenol [Sulfonation]	M
696	Indamine Blue		Aniline (excess) Amino-azo-benzene	B
697	Induline, Spirit Soluble	I '14:— 25,342 M '17:— ? M '18:— 8,589 M '19:— 436,201 M '20:— 140,400	Aniline (excess) Amino-azo-benzene	ss
698	Nigrosine, Spirit Soluble	I '14:— 186,595 M '17:— 302,706 M '18:— 314,151 M '19:— 346,167 M '20:— 919,242	Aniline (excess) Nitro-benzene [Iron] <i>or</i> Aniline (excess) Nitro-phenol	ss
699	Induline, Water Soluble	I '14:— 29,177 M '17:— 183,739 M '18:— 91,724 M '19:— 130,704 I '20:— 500 M '20:— 168,048	Aniline (excess) Amino-azo-benzene [Sulfonation]	A

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	<p>AZINE DYES (<i>continued</i>)</p>			
700	Nigrosine, Water Soluble	<p>I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021</p>	<p>Aniline (excess) Nitro-benzene [Iron; Sulfonation]  or Aniline (excess) Nitro-phenol [Sulfonation]</p>	A
702	Para Blue		<p>Aniline (3-4 mols) o-Toluidine p-Toluidine p-Phenylene-diamine or [Spirit Blue and p-Phenylene-diamine]</p>	B
	<p>SULFUR DYES</p>			
719	Thional Black	I '14:— 16,865	<p>p- (o- or m-)Nitro-aniline o-Nitro-phenol (2 mols) [Na<sub>2</sub>S+S]</p>	S
729	Kryogene Pure Blue R		<p>Aniline (2 mols) Dimethyl-p-phenylene-diamine [Na<sub>2</sub>S+S]  or [Methylene Violet; S, Na<sub>2</sub>S]</p>	S
	<p>ANTHRAQUINONE AND ALLIED DYES</p>			
851	Alizarin Direct Blue B	<p>I '14:— 10,201 I '20:— 2,982</p>	<p>1: 5- (and 1: 8-) Amino-anthraquinone-sulfonic Acid [Dibromination, Sulfonation]</p>	A
857	Erweco Alizarin Acid Blue R		<p>Dinitro-anthraflavin-disulfonic Acid Aniline (2 mols) [Sulfonation]</p>	ACr

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
861	Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) Tetrabromo-1: 5-di- amino-anthraquinone [Sulfonation]	ACr
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Purpurin [ <i>or</i> through Alizarin, <i>or</i> 2-Anthra- quinone-sulfonic acid] [Sulfonation]	M
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone- 6-sulfonic Acid [Halogenation] <i>p</i> -Toluidine	ACr
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Aniline (2 mols) . [Chloro-acetic, Soda- mide] [ <i>or</i> CS <sub>2</sub> , KCN, etc.]	V
876	Indigo MLB Indigo White		Aniline (2 mols) [Chloro-acetic, Soda- mide, Reduction] [ <i>or</i> CS <sub>2</sub> , KCN, etc., Reduction] [ <i>or</i> Indigo, Reduction]	V

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Aniline (2 mols) etc. [or Indigo, Sulfonation]	A
878	Indigotine P		Aniline (2 mols), etc. [or Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Aniline (2 mols), etc. [or Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 M '20:— ?	Aniline (2 mols), etc. [or Indigo, Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Aniline (2 mols), etc. [or Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Aniline (2 mols), etc. [or Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Aniline (2 mols), etc. [or Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Aniline (2 mols), etc. [or Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Aniline (2 mols), etc. [or Indigo, Chlorination]	V

Dyes Derived from Aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Aniline (2 mols), etc. [or Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Aniline (2 mols), etc. Benzoyl chloride [or Indigo, Benzoyl chloride]	V
890	Ciba Yellow G	I '14:— 48	Aniline (2 mols), etc. Benzoyl Chloride [Bromination] [or Indigo Yellow 3G, Bromination]	V
	ANILINE BLACK GROUP			
922	Aniline Black	I '14:— 1,470 M '19:— ? M '20:— ?	Aniline (x mols) [Oxidation on fiber]	MF

**Aniline-2: 4-disulfonic Acid***See, 4-Amino-m-benzene-disulfonic Acid***Aniline-2: 5-disulfonic Acid***See, 2-Amino-p-benzene-disulfonic Acid***Aniline-p-sulfonic Acid***See, Sulfanilic Acid***2-Anilino-5-amino-benzene-sulfonic Acid (C. A. nomen.)***See, p-Amino-diphenylamine-2-sulfonic Acid***4-(p-Anilino-anilino)-o-cresol (C. A. nomen.)***See, 4-Phenylamino-4'-hydroxy-(phenyl-3'-tolylamine)***p-(p-Anilino-anilino)-phenol (C. A. nomen.)***See, 4-Phenylamino-4'-hydroxy-diphenylamine*



**Anilino-benzene-sulfonic Acid** (*C. A. nomen.*)

*See*, Diphenylamine-sulfonic Acid

**8-Anilino-5-(*p*-hydroxy-anilino)-1-naphthalene-sulfonic Acid**  
(*C. A. nomen.*)

*See*, 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid

**8-Anilino-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)

*See*, Phenyl-1-naphthylamine-8-sulfonic Acid

**7-Anilino-1-naphthol-3-sulfonic Acid** (*C. A. nomen.*)

*See*, Phenyl-gamma Acid

***m*-Anilino-phenol** (*C. A. nomen.*)

*See*, *m*-Hydroxy-diphenylamine

**2-Anilino-3-pseudoindolone** (*C. A. nomen.*)

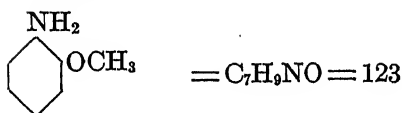
*See*, 2-Isatin Anilide

**Aniline Salt**

*Note.*—*This is Aniline Hydrochloride.*

*See*, Aniline

***o*-Anisidine** ( $NH_2=1$ )



STATISTICS.—Imported '14:—1,411 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—*o*-Nitro-anisole is reduced at 100–110° by means of iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 71

Dyes Derived from *o*-Anisidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
93	MONOAZO DYES Pigment Purple A Sudan R	I '14:— 99	$\beta$ -Naphthol	CL
94	Azo Eosine	I '14:—1,001 M '18:— ? M '19:— ?	Nevile Winther Acid	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	1-Naphthol-4: 8-disulfonic Acid	A
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	Salicylic Acid	M
259	DISAZO DYE Ponceau 10 RB	I '14:— 201	Sulfanilic Acid Croceine Acid	A

## Anthracene



STATISTICS.—Imported '14:—\$37,240 in value

Manufactured '17:— ?

Manufactured '18:— 225,552 lbs.

Manufactured '19:—1,381,944 lbs.

Imported '19:— 51,895 lbs.

Manufactured '20:— 711,258 lbs.

Imported '20:— 648,095 lbs.

FORMATION.—From coal-tar by extraction and purification

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 244

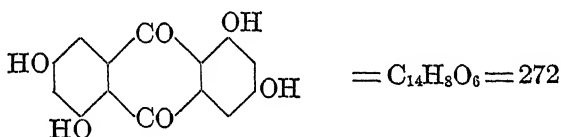
USES.—For manufacture of anthraquinone and anthraquinone derivatives

Dye Derived from Anthracene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
791	ANTHRAQUINONE AND ALLIED DYES Indanthrene Olive G	I '20:—11 M '18:— ?	[Sulfur]	V

Anthrachrysone

1:3:5:7-Tetrahydroxy-anthraquinone



FORMATION.—From 3:5-Dihydroxy-benzoic acid by heating with concentrated sulfuric acid

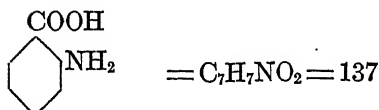
LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 483  
Beil. III, 436; III spl. 312

Dyes Derived from Anthrachrysone

<i>Schultz Number for Dyes</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
790	ANTHRAQUINONE AND ALLIED DYES Acid Alizarin Blue BB	I '14:—26,642 I '20:— 3,539	[Sulfonation, Nitration, Reduction, etc.]	ACr
796	Acid Alizarin Green G	I '20:— 1,334	[Sulfonation, Nitration, Sodium sulfide reduction]	ACr

1:9-Anthradiol (*C. A. nomen.*)

See, 1-Hydroxy-anthranol

**Anthraflavic Acid**2: 6-Dihydroxy-anthraquinone (*not considered herein*)**Anthranilic Acid** (*C. A. nomen. COOH=1*)*o*-Amino-benzoic Acid

STATISTICS.—Imported '14:— 106 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:—11,826 lbs.  
 Manufactured '19:—22,976 lbs.  
 Manufactured '20:— ?

FORMATION.—Phthalic anhydride is melted and heated to 240°, whereupon ammonia gas is introduced, forming phthalimide. This latter is treated with sodium hypochlorite, forming anthranilic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 147  
 Lange, Zwischenprodukte, #357–367, 1619

**Dyes Derived from Anthranilic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
200	MONOAZO DYES Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	$\beta$ -Naphthol	CL
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Schaeffer's Acid	CL
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:—28,081 I '20:— 1,342 M '20:—67,817	R-Acid	ACr CL

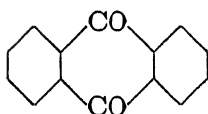
Dyes Derived from Anthranilic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
832	ANTHRAQUINONE AND ALLIED DYES Indanthrene Violet RN	I '14:—11,667 I '20:— 49	Anthranilic Acid (2 mols) 1:5-Dichloro-anthraqui- none	V

**Anthrano**

*See, 9-Anthrol*

**Anthraquinone**



STATISTICS.—Imported '14:— 29,850 lbs.

Manufactured '18:— ?

Manufactured '19:—294,260 lbs.

Manufactured '20:—539,619 lbs.

FORMATION.—(1) From anthracene by appropriate oxidation means; for example, chromic acid. (2) From *o*-benzoyl-benzoic acid by action of sulfuric acid. The *o*-benzoyl-benzoic acid is prepared by reacting together phthalic anhydride, benzene and aluminum chloride

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 244

Lange, *Zwischenprodukte*, #23, 648, 3065-3080

## Dye Derived from Anthraquinone

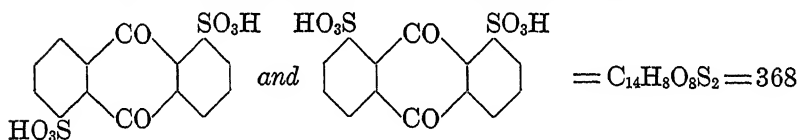
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
863	ANTHRAQUINONE AND ALLIED DYES Anthraquinone Blue Green BXO	I '14:—6,552 I '20:— 849	[?]	A

*Note.*—Most of the dyes listed in the class "Anthraquinone and Allied Dyes" (Schultz, #758–873) are derived indirectly from anthraquinone. These dyes are, however, not tabulated under anthraquinone, but under that intermediate from which directly derived.

**Anthraquinone-1:5-and-1:8-disulfonic Acids**

Rho Acid is trivial name for the 1:5-disulfonic Acid

Chi Acid is trivial name for the 1:8-disulfonic Acid



STATISTICS.—The anthraquinone-1:5-disulfonate was manufactured in 1918, 1919, 1920 by one company. Amount was not disclosed

FORMATION.—Anthraquinone is sulfonated with strong oleum in the presence of mercury or mercuric oxide to a mixture of the 1:5- and 1:8-disulfonic acids, which are separated by crystallization

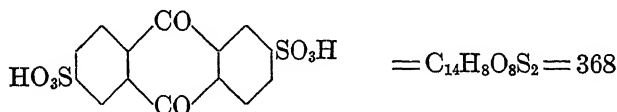
LITERATURE.—Cain, Intermediate Products (2d Ed.), 252

Lange, Zwischenprodukte, #3290–3293

USES.—The 1:5-acid is employed for making anthrarufin, 1:5-dichloro-anthraquinone, etc.

**Anthraquinone-2:6-disulfonic Acid**

$\alpha$ -Anthraquinone-disulfonic Acid



FORMATION.—From anthraquinone by heating with 45 per cent oleum to 160–170° C., dilution with water, neutralization with caustic soda and evaporation until the 2: 6 acid crystallizes out (2: 7 acid in mother liquor)

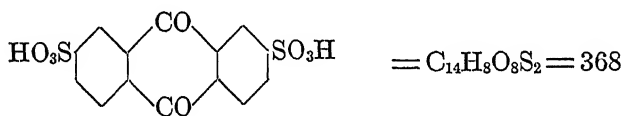
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253  
Lange, Zwischenprodukte, #3290

**Dyes Derived from Anthraquinone-2: 6-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
785	ANTHRAQUINONE AND ALLIED DYES Alizarin GI Flavopurpurin	I '14:—49,021	[Alkaline Fusion]	M
786	Alizarine Red 3WS		[Alkaline fusion, sulfonation]	M

**Anthraquinone-2: 7-disulfonic Acid**

$\beta$ -Anthraquinone-disulfonic Acid



STATISTICS.—Manufactured '19:— ?  
Manufactured '20:— ?

FORMATION.—From anthraquinone by heating with 45 per cent Oleum, dilution with water, neutralization with caustic soda, and evaporation until the 2: 6 disulfonic acid crystallizes out. The 2: 7 disulfonic acid is then obtained (as sodium salt) by evaporating this mother liquor to dryness

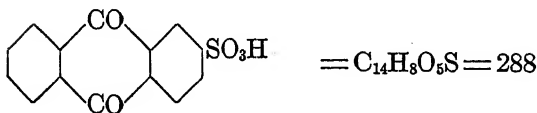
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253  
Lange, Zwischenprodukte, #3290

**Dye Derived from Anthraquinone-2:7-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
784	ANTHRAQUINONE AND ALLIED DYES Alizarin SX Isopurpurin	I '14:—14,273 M '19:— ? I '20:— 49 M '20:— ?	[Alkaline fusion]	M

 **$\alpha$ -Anthraquinone-disulfonic Acid***See, Anthraquinone-2: 6-disulfonic Acid* **$\beta$ -Anthraquinone-disulfonic Acid***See, Anthraquinone-2: 7-disulfonic Acid***Anthraquinone-2-sulfonic Acid**Anthraquinone- $\beta$ -sulfonic Acid $\beta$  Acid or Beta Acid

Silver salt (Sodium derivative)

 $\beta$ -Sulfonic Acid

STATISTICS.—Manufactured 1918:— ?

Manufactured 1919:— ?

Manufactured 1920:— ?

FORMATION.—From anthraquinone by sulfonating with an equal weight of 45–50 per cent oleum and heating up to 160° C., diluting, neutralizing with caustic soda, and evaporating to crystallization of the sodium salt ("Silver salt")

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 251Lange, *Zwischenprodukte*, #3156–3163

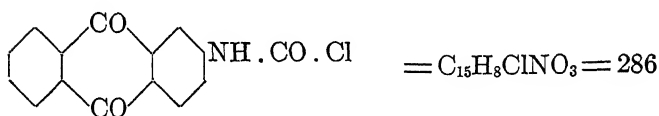


Dyes Derived from Anthraquinone-2-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
778	Alizarin	I '14:—202,392 M '17:— ? M '18:— ? M '19:— ? I '20:— 8,575 M '20:— ?	[Oxidation]	M
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[Alizarin, Nitration]	M
780	Alizarin Red	I '14:— 81,919 M '17:— ? I '20:— 12,628	[Alizarin, Sulfonation]	M
781	Erweco Alizarin Acid Red BS		[Alizarin, Sulfonation]	M
783	Purpurin		[Alizarin, Oxidation]	M
787	Alizarin Bordeaux B	I '20:— 20	[Alizarin, Oxidation]	M
788	Alizarin Cyanine R	I '20:— 16,781	[Alizarin Bordeaux B, Oxidation]	M
797	Alizarin Garnet R	I '14:— 720	[4-Nitro-alizarin, Re- duction]	M
798	Alizarin Maroon W	I '20:— 2,014	[Crude Nitro-alizarin, Reduction]	M
799	Alizarin Cyanine G	I '20:— 339	[Alizarin Cyanine R, Amidation]	M
854	Alizarin Viridine DG	I '20:— 11,397	[Alizarin Bordeaux B] <i>p</i> -Toluidine (2 mols) [Sulfonation]	M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	[Purpurin] Aniline [Sulfonation]	M

**Anthraquinone- $\beta$ -sulfonic Acid***See*, Anthraquinone-2-sulfonic Acid**2-Anthraquinone-urea Chloride***See*, 2-Anthraquinonyl-urea Chloride**2-Anthraquinonyl-urea Chloride**

2-Anthraquinone-urea Chloride



FORMATION.—From 2-Amino-anthraquinone in nitro-benzene solution by action of phosgene at 50°

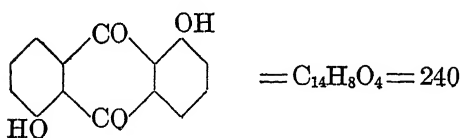
LITERATURE.—Lange, Zwischenprodukte, #3123

**Dyes Derived from 2-Anthraquinonyl-urea Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
835	Helindone Orange GRN	I '20:— 74	2-Anthraquinonyl-urea chloride (2 mols)	V
836	Helindone Brown 2GN	I '20:—15,238	2-Anthraquinonyl-urea chloride (2 mols) Diamino-anthraquinones, [various]	V

**Anthrarufin**

1:5-Dihydroxy-anthraquinone



STATISTICS.—Manufactured 1918:— ?  
 Manufactured 1919:— ?  
 Manufactured 1920:— ?

FORMATION.—This compound is obtained by the action of milk of lime on either anthraquinone-1:5-disulfonic acid or on 1:5-dinitro-anthraquinone

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 257  
 Ullmann, *Enzy. tech. Chemie*, **1**, 481  
 Lange, *Zwischenprodukte*, #3269, 3272, 3287

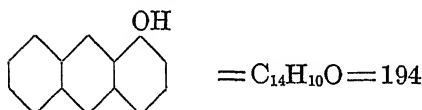
**Dye Derived from Anthrarufin**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
858	ANTHRAQUINONE AND ALLIED DYES Alizarin Saphirol B	M '18:— ? M '19:— ? I '20:— 28,210 M '20:— ?	[Sulfonation, Nitration, Reduction]	ACr

**1-Anthrol** (*C. A. nomen.*)

$\alpha$ -Anthrol

1-Hydroxy-anthracene



FORMATION.—From 1-anthracene-sulfonic acid by fusion with 5 parts of caustic soda at about 250°

LITERATURE.—Schmidt, *Ber.* **37**, 66 (1904)  
 Thorpe, *Dic. Chemistry*, **1**, 274; (1921 Ed.), **1**, 352

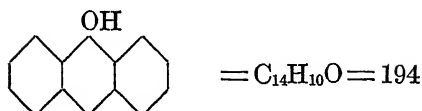
**Dye Derived from 1-Anthrol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
893	INDIGO GROUP DYE Alizarin Indigo G	I '20:—1,596	Dibromo-isatin chloride	V

**9-Anthrol** (*C. A. nomen.*)

9-Hydroxy-anthracene

Anthranol



**FORMATION.**—Anthraquinone is reduced with tin in boiling glacial acetic acid solution, or with iron and ferrous chloride solution

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 262

Thorpe, *Dic. Chemistry*, **1**, 272; (1921 Ed.), **1**, 349

Lange, *Zwischenprodukte*, #3038–3040

**Dyes Derived from 9-Anthrol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
763	ANTHRAQUINONE AND ALLIED DYES			
	Indanthrene Dark Blue BO	I '14:—11,096 I '20:—13,917 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols)]	V
764	Indanthrene Violet RT		9-Anthrol (2 mols) [Glycerol (2 mols), Halogenation] or [Indanthrene Dark Blue BO and Halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	9-Anthrol (2 mols) [Glycerol (2 mols), Nitration] or [Indanthrene Dark Blue BO and Nitration]	V
872	Leucol Brown B	I '20:— 22		V

**Armstrong's Acid**

*See, Naphthalene-1:5-disulfonic Acids*

**Armstrong's  $\delta$  Acid**

*See*, Naphthalene-1: 5-disulfonic Acid

**Armstrong and Wynne's Acid**

1-Naphthol-3-sulfonic Acid (*not considered herein*)

**Armstrong and Wynne's Acid II**

*See*, 2-Naphthylamine-5: 7-disulfonic Acid

**5: 5'-A oxy-bis-o-toluidine (C. A. nomen.)**

*See*, Diamino-azoxy-toluene

***p*-Azoxy-o-toluidine**

*See*, Diamino-azoxy-toluene

**B Acid**

*See*, 1-Amino-8-naphthol-3: 5-disulfonic Acid

*This trivial name also applied to*

1-Amino-7-naphthol-3-sulfonic Acid

2: 3-Dihydroxy-naphthalene-6: 8-disulfonic Acid

**Badische Acid**

*See*, 2-Naphthylamine-8-sulfonic Acid

**Baum's Acid**

1-Naphthol-2-sulfonic Acid (*not considered herein*)

**Bayer's Acid**

*See*, Croceine Acid

*See*, 2-Naphthylamine-7-sulfonic Acid

**Benzal-bisxylylidine (C. A. nomen.)**

*See*, Diamino-dixylyl-phenyl-methane

**Benzaldehyde**

HCO

 $= C_7H_6O = 106$ 

STATISTICS.—Imported '14:— 20,475 lbs.

Manufactured '17:—132,336 lbs.

Manufactured '18:—360,591 lbs.

Manufactured '19:—518,634 lbs.

Manufactured '20:—702,543 lbs.

FORMATION.—(1) From toluene by chlorination to benzylidene chloride,  $C_6H_5CHCl_2$ , and by heating this with milk of lime under pressure.

(2) From toluene by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 138

Lange, Zwischenprodukte, #20-41

**Dyes Derived from Benzaldehyde**

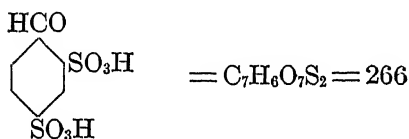
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
495	TRIPHENYL-METHANE DYES Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) [Oxidation]	B
499	Brilliant Green	I '14:— 73,904 M '18:— ? M '19:— ? I '20:— 25 M '20:— ?	Diethyl-aniline (2 mols) [Oxidation]	B
502	Guinea Green B Acid Green 3BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A

Dyes Derived from Benzaldehyde (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	TRIPHENYL-METHANE DYES (continued)			
504	Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl- aniline (2 mols) [Sulfonation and Oxidation]	A
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl- aniline (2 mols) [Sulfonation and Oxidation]	A
604	ACRIDINE DYES Acridine Orange R		Dimethyl- <i>m</i> -phenylene- diamine (2 mols) [Ammonia removal; Oxidation]	B
605	Benzoflavine	I '14:— 600	<i>m</i> -Tolylene-diamine (2 mols) [Ammonia removal, Oxidation]	B

Benzaldehyde-disulfonic Acid

4-Formyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

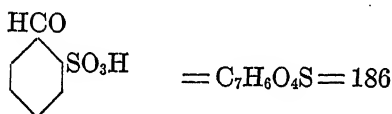


FORMATION.—Toluene is sulfonated with oleum to the 2:4-disulfonic acid, which is then oxidized with manganese dioxide

LITERATURE.—Lange, Zwischenprodukte, #899

## Dye Derived from Benzaldehyde-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
579	XANTHONE DYES Sulfo Rhodamine B Xylene Red B	I '14:—1,698	Diethyl- <i>m</i> -amino-phenol (2 mols) [Oxidation]	A

Benzaldehyde-*o*-sulfonic Acid*o*-Formyl-benzene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—By heating *o*-chloro-benzaldehyde with  $\text{Na}_2\text{SO}_3$  at around 170–180° under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 146  
Lange, Zwischenprodukte, #504–506

Dyes Derived from Benzaldehyde-*o*-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
506	TRIPHENYL-METHANE DYES Erioglaurine	I '14:—66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl-aniline or Benzyl-ethyl-aniline (2 mols) [and sulfonation] [Oxidation]	A
553	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	<i>o</i> -Cresotic Acid (2 mols) [Oxidation]	ACr



**Benzamido-** (*C. A. nomen. for  $C_6H_5CO.NH$* )

*See, Benzoylamino-*

*Note.*—The *C. A.* name for this radical is the scientific one, and it is listed as an alternate, but in view of the widespread use of benzoylamino-, the latter is given precedence at the present time.

**1-Benzamido-4-chloro-anthraquinone** (*C. A. nomen.*)

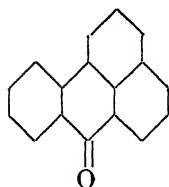
*See, 1-Benzoylamino-4-chloro-anthraquinone*

**7-meso-Benzanthren-7-one** (*C. A. nomen.*)

*See, Benzanthrone*

**Benzanthrone**

**7-meso-Benzanthren-7-one** (*C. A. nomen.*)



STATISTICS.—Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—(1) From anthranol and glycerol by condensation by means of sulfuric acid. (Anthranol is made from anthraquinone.)

(2) From anthracene in sulfuric acid solution, by addition of glycerol and heating to 100–110° C. until the anthracene disappears. The reaction mass is then diluted with water, salted out and purified

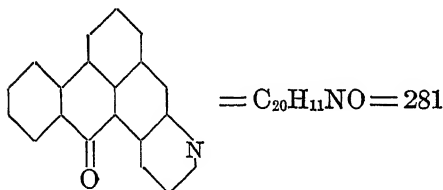
LITERATURE.—Cain, Intermediate Products (2d Ed.), 262

Lange, Zwischenprodukte, #3584

## Dyes Derived from Benzanthrone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
763	ANTHRAQUINONE AND ALLIED DYES Indanthrene Dark Blue BO	I '14:— 11,096 I '20:— 13,917	Benzanthrone (2 mols)	V
764	Indanthrene Violet RT		Benzanthrone (2 mols) [Halogenation] [or Indanthrene Dark Blue BO and halogenation]	V
765	Indanthrene Green B	I '14:—72,251 M '19:— ? I '20:— 6,765 M '20:— ?	Benzanthrone (2 mols) [Nitration] [or Indanthrene Dark Blue BO and Nitration]	V

## Benzanthrone-quinoline

Phenanthroquinolinone (*C. A. nomen.*)

FORMATION.—From 2-amino-anthraquinone and glycerol by warming with condensing agents, for example, sulfuric acid

LITERATURE.—Lange, *Zwischenprodukte*, #3596

Ullmann, *Enzy. tech. Chemie*, 3, 314

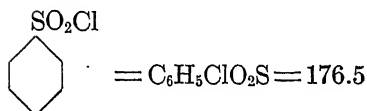
## Dye Derived from Benzanthrone-quinoline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
846	ANTHRAQUINONE AND ALLIED DYES Indanthrene Dark Blue BT		Benzanthrone-quinoline (2 mols)	V

**Benzene-azo-diethylaniline**

*See, p*-Diethylamino-azo-benzene

**Benzene-sulfonyl Chloride**



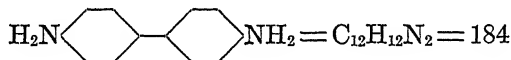
FORMATION.—From benzene-sulfonic acid by treatment with phosphorus pentachloride

LITERATURE.—Bucherer, *Farbenchemie*, 78, 150

**Dye Derived from Benzene-sulfonyl Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
182	MONOAZO DYE Fast Sulfon Violet Brilliant Sulfon Red B	I '14:—4,871 I '20:—4,740	H Acid Aniline	A

**Benzidine**



STATISTICS.—Imported '14:— 55,245 lbs.  
 Manufactured '17:—1,766,582 lbs.  
 Manufactured '18:—2,501,887 lbs.  
 Manufactured '19:—1,319,629 lbs.  
 Manufactured '20:—2,183,583 lbs.

FORMATION.—Nitro-benzene is reduced to hydrazo-benzene with zinc or iron in presence of caustic soda; the hydrazo-benzene is rearranged to benzidine by treatment with acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 89  
 Lange, *Zwischenprodukte*, #1204

## Dyes Derived from Benzidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
15	MONOAZO DYES Chicago Orange G		<i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid	D
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid	M
103	Dutch Yellow		Salicylic Acid [Sodium sulfite]	M
306	DISAZO DYES Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Nitro- <i>m</i> -phenylene-diamine <i>m</i> -Phenylene-diamine-disulfonic Acid	D
307	Congo Red	I '14:— 20,629 M '17:— ? M '18:— 587,153 M '19:— 873,734 M '20:— 1,502,630	Naphthionic Acid (2 mols)	D
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols)	D
309	Glycine Red		$\alpha$ -Naphthyl-glycine Naphthionic Acid	D
310	Glycine Corinth		$\alpha$ -Naphthyl-glycine (2 mols)	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:— 137,704 M '20:— 242,503	Nevile Winther's Acid Naphthionic Acid	D

Dyes Derived from Benzidine (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	DISAZO DYES (continued)			
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Croceine Acid Naphthionic Acid	D
314	Pyramine Orange RR	I '14:— 2,789	Nitro- <i>m</i> -phenylene- diamine Amino-R Acid	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Phenol Amino-R Acid [Ethylation]	D
316	Brilliant Congo G		Amino-R Acid Broenner's Acid	D
317	Pyramidol Brown BG		Resorcinol (2 mols)	D
318	Benzidine Puce		$\beta$ -Naphthol	MF
319	Diamine Scarlet	I '14:— 41,175 I '20:— 11,340	Phenol G Acid [Ethylation]	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Croceine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Croceine Acid 1-Naphthol-4: 8- disulfonic Acid	D
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	$\beta$ -Naphthol 1-Naphthol-3: 6: 8- tri- sulfonic Acid	D

## Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
323	Dianil Blue R	M '20:— ?	Chromotropic Acid (2 mols)	D
324	Chicago Blue 4R	I '14:— 1,199	Croceine Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
325	Columbia Blue R	I '14:— 3,071	1-Naphthol-3: 8-disul- fonic Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
326	Oxamine Violet Oxydiamine Violet BF	I '14:— 23,981 I '20:— 732	J Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	<i>m</i> -Phenylene-diamine Gamma Acid	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Gamma Acid 2: 7-Naphthylene- diamine-sulfonic Acid	D
331	Alkali Dark Brown GV		Nitroso- $\beta$ -naphthol Gamma Acid	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Gamma Acid Amino-R Acid	D
333	Diamine Black BH Oxamine Black BHN	I '14:— 619,430 M '17:— ? M '18:— ? M '19:— 485,046 I '20:— 5,512 M '20:— 803,501	Gamma Acid H Acid	D

Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
334	Diphenyl Blue Black	I '14:— 26,240	Ethyl-gamma Acid H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Gamma Acid K Acid	D
336	Benzo Cyanine R	I '14:— 201	H Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
337	Diamine Blue BB Benzo Blue BB	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	H Acid (2 mols)	D
338	Naphthamine Blue 2B	I '14:— 11,707 I '20:— 400	K Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Salicylic Acid 3-Amino-phenol-4- sulfonic Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Salicylic Acid Naphthionic Acid	D
340 (1)	Chlorazol Orange 2R		Salicylic Acid 2-Naphthylamine-7- sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Salicylic Acid R Salt	D

## Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:— 115,865	Gamma Acid Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,957 M '20:— 257,872	Salicylic Acid Gamma Acid	D
345	Oxamine Maroon		Salicylic Acid 1-Amino-5-naphthol-7- sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	J Acid Salicylic Acid	D
347	Diphenyl Brown RN		Salicylic Acid Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Salicylic Acid Phenyl-gamma Acid	D
350	Alkali Yellow R		Salicylic Acid Dehydrothio- <i>p</i> -tolui- dine-sulfonic Acid	D
351	Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	<i>o</i> -Cresotic Acid (2 mols)	D



Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
352	Direct Violet R	I '14:— 661 M '19:— ?	<i>m</i> -Tolylene-diamine I: 7-Dihydroxy-6-naph- thoic-3-sulfonic Acid	D
353	Direct Indigo Blue BN	I '14:— 6,000	1: 7-Dihydroxy-6-naph- thoic-3-sulfonic Acid H Acid	D
354	Direct Gray R	I '20:— 4,927	1: 7-Dihydroxy-6-naph- thoic-3-sulfonic Acid (2 mols)	D
	TRISAZO DYES			
438	Melogene Blue BH	M '17:— ? M '18:— ?	H Acid (2 mols) <i>p</i> -Xylidine	D
439	Direct Indigo Blue A	M '18:— ?	H Acid (2 mols) <i>m</i> -Amino- <i>p</i> -cresol Methyl Ether	D
440	Direct Indigo Blue BK		Gamma Acid (2 mols) <i>m</i> -Amino- <i>p</i> -cresol Methyl Ether	D
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	H Acid (2 mols) $\alpha$ -Naphthylamine	D
442	Direct Black V	I '14:—145,738	Gamma Acid $\alpha$ -Naphthylamine 2 R Acid	D
443	Direct Indone Blue R		$\alpha$ -Naphthylamine H Acid 2 R Acid	D
444	Crumpsall Direct Fast Brown B		Salicylic Acid Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Salicylic Acid Aniline Phenyl-gamma Acid	D

Dyes Derived from Benzidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES ( <i>continued</i> )			
446	Benzo Olive	I '14:— 1,149	Salicylic Acid $\alpha$ -Naphthylamine H Acid	D
447	Benzo Gray S Extra	I '14:— 802	Salicylic Acid $\alpha$ -Naphthylamine Nevile Winther's Acid	D
448	Diamine Bronze G	I '14:— 4,495	Salicylic Acid H Acid <i>m</i> -Phenylene-diamine	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	2 R Acid Salicylic Acid <i>m</i> -Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Aniline H Acid <i>m</i> -Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Aniline H Acid <i>m</i> -Tolylene-diamine	D
464	Erie Direct Green E T	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Aniline H Acid Phenol	D
465	Columbia Black Green D		Salicylic Acid Aniline 1: 8-Amino-naphthol-4- sulfonic Acid	D

Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
466	Eboli Green		1-Amino-8-naphthol- 3: 5-disulfonic Acid Salicylic Acid Sulfanilic Acid	D
467	Diphenyl Green G	I '20:— 2,205	Phenol H Acid <i>o</i> -Chloro- <i>p</i> -nitro- aniline	D
468	Diphenyl Green 3G		Salicylic Acid H Acid <i>o</i> -Chloro- <i>p</i> -nitro- aniline	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	<i>m</i> -Phenylene-diamine H Acid 2: 5-Dichloro-aniline	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ?	Phenol H Acid 2: 5-Dichloro-aniline	D
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	H Acid (2 mols) 2:5-Dichloro-aniline	D
472	Chloramine Blue HW		Gamma Acid H Acid 2: 5-Dichloro-aniline	D
473	Diamine Black HW	I '20:— 342	Gamma Acid H Acid <i>p</i> -Nitro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:—295,147 M '19:—305,854 I '20:— 2,460 M '20:—420,138	Phenol H Acid <i>p</i> -Nitro-aniline	D

## Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:— 136,638 I '20:— 1,332 M '20:— 53,292	Salicylic Acid H Acid <i>p</i> -Nitro-aniline	D
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:— 623,757	Sulfanilic Acid <i>m</i> -Phenylene-diamine Salicylic Acid	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:— 229,489	Sulfanilic Acid Resorcinol Salicylic Acid	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Salicylic Acid Sulfanilic Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
479	Dianil Black R		Chromotropic Acid Naphthionic Acid <i>m</i> -Phenylene-diamine	D
480	Congo Brown R	I '14:— 3,045	Resorcinol Salicylic Acid Laurent's Acid	D
489	TETRAKISAZO DYES Hessian Brown BBN		Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
490	Cotton Brown A	I '14:— 29,074	Naphthionic Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D

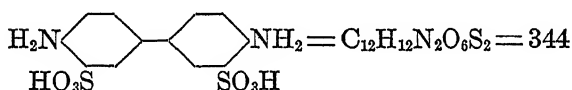
## Dyes Derived from Benzidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
712	SULFUR DYES Kyrogene Yellow G	I '14:— 1,126 I '20:— 1,543	<i>m</i> -Tolylene-dithio-urea [Sulfur]	S
714	Thiophor Yellow Bronze G		<i>p</i> -Phenylene-diamine <i>p</i> -Amino-acetanilide [Sulfur]	S

## Benzidine-disulfonic Acid

6: 6'-Diamino-*m*: *m'*-bi(benzene-sulfonic) Acid (*C. A. nomen.*)

4: 4'-Diamino-diphenyl-3: 3'-disulfonic Acid



FORMATION.—From benzidine sulfate by heating with 2 parts of sulfuric acid at about 210° for forty-eight hours

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 94

Griess and Duisberg, *Ber.*, **22**, 2464 (1889)

*Cf.* Griess, *Ber.*, **14**, 300 (1881)

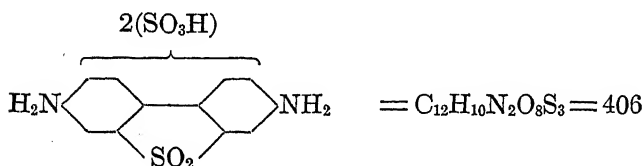
*Cf.* Farbenfabriken, *Ger. Pat.* 27954

## Dyes Derived from Benzidine-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
360	DISAZO DYE Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Nitro- <i>m</i> -phenylene-diamine	D
459	TRISAZO DYES Benzo Black Blue G		Nevile-Winther's Acid (2 mols) $\alpha$ -Naphthylamine	D
460	Benzo Black Blue 5G	I '14:— 602	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols) $\alpha$ -Naphthylamine	D

**Benzidine-sulfon-disulfonic Acid**

4: 4'-Diamino-diphenyl-2: 2'-sulfon-disulfonic Acid

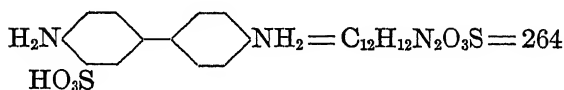
2: 7-Diamino-9-dioxide-? :?-dibenzothiophene-disulfonic Acid (*C. A. nomen.*)

FORMATION.—Benzidine sulfate is heated with 40 per cent oleum for 1 hour at 100° in an autoclave, and then at 150° until a sample dissolves in hot water and does not give a yellow precipitate with alkali

LITERATURE.—Lange, Zwischenprodukte, #1275

**Dyes Derived from Benzidine-sulfon-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
361	DISAZO DYE Sulfonazurine	I '14:—300	Phenyl- $\alpha$ -naphthyl-amine (2 mols)	D

**Benzidine-sulfonic Acid**2-Amino-5-(*p*-amino-phenyl)-benzene-sulfonic Acid (*C. A. nomen*  
 $\text{SO}_3\text{H} = 1$ )

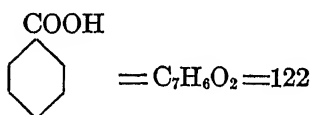
FORMATION.—From benzidine sulfate by evaporating to dryness with dilute sulfuric acid ( $1\frac{1}{2}$  mols), and then heating in air bath at about  $170^{\circ}$  for 24 hours

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 318

**Dyes Derived from Benzidine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
359	DISAZO DYE Trypan Red		Amino-R Acid (2 mols)	Medi- cinal
491	TETRAKISAZO DYE Dianil Black PR		Gamma Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D

**Benzoic Acid**



STATISTICS.—Imported '14:—352,201 lbs.  
 Manufactured '17:—219,210 lbs.  
 Manufactured '18:—282,212 lbs.  
 Manufactured '19:—720,320 lbs.  
 Manufactured '20:—743,113 lbs.

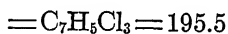
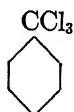
FORMATION.—(1) From toluene by chlorination to benzo-trichloride, and hydrolysis with milk of lime. (2) From toluene by direct oxidation with nitric acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 325  
 Lange, Zwischenprodukte, #24, 59

## Dyes Derived from Benzoic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
509	TRIPHENYL- METHANE DYES Chrome Green		Hydrol [Oxidation]	M
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) <i>p</i> -Toluidine or [ <i>p</i> -Rosaniline tripheny- lated]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (2-4 mols) <i>o</i> -Toluidine <i>p</i> -Toluidine or [Fuchsine or Rosaniline base phenylated]	ss
770	ANTHRAQUINONE AND ALLIED DYES Alizarin Yellow A		Pyrogallol	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M

## Benzo-trichloride

*α*-Trichloro-toluene (*C. A. nomen.*)

STATISTICS.—Imported '14:—very small  
 Manufactured '18:— ?  
 Manufactured '20:— ?



FORMATION.—From toluene by treatment with chlorine, preferably in presence of catalyst

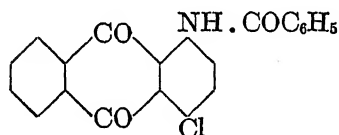
LITERATURE.—Cain, Intermediate Products (2d Ed.), 19

**Dyes Derived from Benzo-trichloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
610	QUINOLINE DYE Quinoline Red		Quinaldine Isoquinoline	B
770	ANTHRAQUINONE AND ALLIED DYES Alizarin Yellow A		Pyrogallol	M

**1-Benzoylamino-4-chloro-anthraquinone**

1-Benzamido-4-chloro-anthraquinone (*C. A. nomen.*)



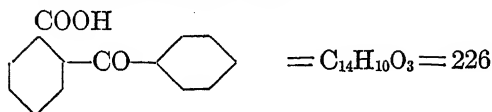
$$= \text{C}_{21}\text{H}_{12}\text{ClNO}_3 = 361.5$$

FORMATION.—By heating 1-Amino-4-chloro-anthraquinone with benzoyl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 164

**Dye Derived from 1-Benzoylamino-4-chloro-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
833	ANTHRAQUINONE AND ALLIED DYES Algol Olive R	I '14:— 13,334 I '20:— 461	1-Benzoylamino-4-amino-anthraquinone [Chloro-sulfonic acid]	V

**o-Benzoyl-benzoic Acid**

STATISTICS.—Manufactured 1920:— ?

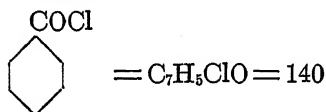
FORMATION.—By condensation of phthalic anhydride and benzene in presence of aluminum chloride

LITERATURE.—Heller, Zeit. angew. Chem., **19**, 669 (1906)

Heller, Ber., **41**, 3631 (1908)

Cain, Intermediate Products (2d Ed.), 249

USES.—For synthesis of anthraquinone

**Benzoyl Chloride**

STATISTICS.—Manufactured '17:—20,621 lbs.

Manufactured '18:— 6,585 lbs.

Manufactured '19:— ?

Manufactured '20:—14,277 lbs.

FORMATION.—From benzoic acid by action of sulfuryl chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, **2**, 329

Lange, Zwischenprodukte, #42

**Dyes Derived from Benzoyl Chloride**

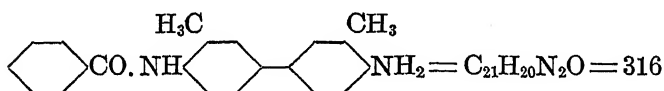
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
814	ANTHRAQUINONE AND ALLIED DYES Algol Yellow WG	I '14:— 5,185 I '20:— 4	1-Amino-anthraquinone	V
815	Algol Scarlet G	I '20:— 959	1-Amino-4-methoxy-anthraquinone	V

Dyes Derived from Benzoyl Chloride (*continued*)

<i>Chemical Number or Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
816	Algol Red 5G	I '14:— 1,338 I '20:— 51	1: 4-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	1: 5-Diamino-anthraquinone Benzoyl chloride (2 mols)	V
818	Algol Pink R	I '14:— 126 I '20:— 1,368	1-Amino-4-hydroxy-anthraquinone	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	1: 5-Diamino-anthraquinone Benzoyl chloride (2 mols) [Oxidation]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Diamino-anthrarufin Benzoyl chloride (2 mols)	V
822	Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	1: 2: 4-Triamino-anthraquinone (?)	V
823	Algol Violet B	I '20:— 69	1-Amino-4: 5: 8-tri-hydroxy-anthraquinone	V
870	Algol Corinth R	I '20:— 134	1-Amino-anthraquinone 2-Chloro-anthraquinone [Nitration, Reduction]	V

Dyes Derived from Benzoyl Chloride (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
889	INDIGO GROUP DYES Indigo Yellow 3G		Indigo or Phenyl-glycine or Phenyl-glycine- <i>o</i> -carboxylic acid or Thiocarbamilide or Aniline or Phthalic Anhydride	
890	Ciba Yellow G	I '14:— 48	Indigo or Phenyl-glycine or Phenyl-glycine- <i>o</i> -carboxylic acid or Thiocarbamilide or Aniline or Phthalic Anhydride [Bromination]	

*N*-Benzoyl-*o*-tolidine

STATISTICS.—Manufactured 1919:— ?

FORMATION.—Tolidine is heated in toluene solution with benzoyl chloride under a reflux condenser

LITERATURE.—Lange, *Zwischenprodukte*, #1281Dyes Derived from *N*-Benzoyl-*o*-tolidine

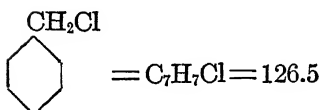
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
104	MONOAZO DYE Benzoyl Pink		Neville-Winther's Acid	D

[(*N*-Benzyl-anilino) -methyl]-benzene-sulfonic Acid (*C. A. nomen.*)

See Dibenzyl-aniline-sulfonic Acid

**Benzyl Chloride**

$\alpha$ -Chloro-toluene (*C. A. nomen.*)



STATISTICS.—Imported '14:— 4,589 lbs.  
 Manufactured '17:— 136,179 lbs.  
 Manufactured '18:— 690,930 lbs.  
 Manufactured '19:— 720,953 lbs.  
 Manufactured '20:—1,246,412 lbs.

FORMATION.—From boiling toluene by passing in chlorine until the theoretical amount (37.5%) has been absorbed

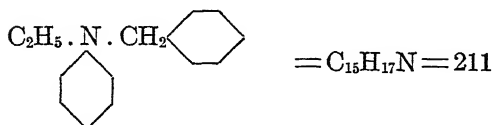
LITERATURE.—Cain, Intermediate Products (2d Ed.), 15  
 Lange, Zwischenprodukte, #5

**Dyes Derived from Benzyl Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
517	TRIPHENYL-METHANE DYES Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] or Dimethyl-aniline (3 mols) Phenol	B
523	Fast Green	I '14:— 14,347 I '20:— 3,612	<i>m</i> -Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl chloride (2 mols) [Sulfonation, Oxidation]	A
586	XANTHONE DYE Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols)	A

**Benzyl-ethyl-aniline**

Ethyl-benzyl-aniline

*N*-Ethyl-*N*-phenyl-benzylamine (*C. A. nomen.*)

STATISTICS.—Imports 1914:—small amount

Manufactured 1917:— ?

Manufactured 1918:— ?

Manufactured 1919:— ?

Manufactured 1920:—159,636 lbs.

FORMATION.—From one part of ethyl-aniline and two parts of benzyl chloride, by boiling under a reflux condenser for four hours

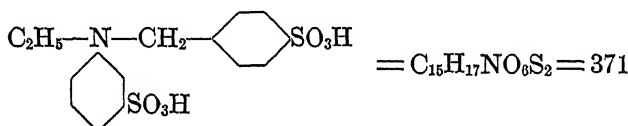
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 69**Dyes Derived from Benzyl-ethyl-aniline**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
505	Light Green SF Yellowish	I '14:— 71,462 M '19:— ? I '20:— 7,490 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
506	Erioglaucine.	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Benzyl-ethyl-aniline (2 mols) Benzaldehyde- <i>o</i> -sulfonic acid [Sulfonation; Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4: 6-disulfonic Acid [Oxidation]	A

Dyes Derived from Benzyl-ethyl-aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
545	TRIPHENYL-METHANE DYES ( <i>continued</i> ) Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) <i>m</i> -Nitro-benzaldehyde or <i>m</i> -Hydroxy-benzal- dehyde [Sulfonation; Oxidation]	A

## Benzyl-ethyl-aniline-disulfonic Acid

*N*-Ethyl-*N*-(*p*-sulfo-benzyl)-metanilic Acid (*C. A. nomen.*)

*Note.*—Position of sulfonic group in the benzyl radical is not fully determined

STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—Benzyl-ethyl-aniline is dissolved with cooling in two parts of 20 per cent oleum, and is then treated with two and a half parts of 80 per cent oleum, and the mixture warmed at 60° until the sulfonation is complete

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 70

Lange, *Zwischenprodukte*, #1500

## Dye Derived from Benzyl-ethyl-aniline-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
528	TREPHENYL- METHANE DYES Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Hydrol [Oxidation]	A

Benzyl-ethyl-aniline-sulfonic Acid<sup>1</sup>

*See*, Ethyl-sulfobenzyl-aniline

Benzyl-ethyl-*p*-phenylene-diamine-sulfonic Acid

*See*, Ethyl-sulfobenzyl-*p*-phenylene-diamine

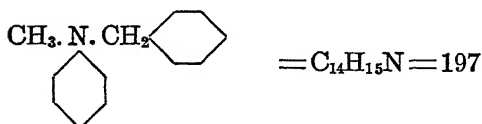
## 3-Benzylimino-4-methyl-diphenylamine

*See*, *N*<sup>3</sup>-Benzyl-*N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine

## Benzyl-methyl-aniline

Methyl-benzyl-aniline

*N*-Methyl-*N*-phenyl-benzylamine (*C. A. nomen.*)



FORMATION.—From methyl-aniline and benzyl chloride by heating together on a water bath for a few hours

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 69

<sup>1</sup> The data and the dye table should have been placed here rather than under ethyl-sulfobenzyl-aniline. — The Author.

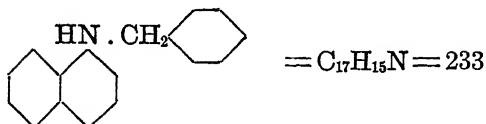


Dyes Derived from Benzyl-methyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
504	TRIPHENYL-METHANE DYES Light Green SF Bluish	I '14:— 6,693 M '17:— ? M '18:— ?	Benzyl-methyl-aniline (2 mols) Benzaldehyde [Sulfonation; Oxidation]	A
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335 M '20:— ?	Ketone [Sulfonation]	A

Benzyl- $\alpha$ -naphthylamine

*N*-Benzyl-1-naphthylamine (*C. A. nomen.*)



FORMATION.— $\alpha$ -Naphthylamine is heated in an autoclave with benzyl chloride in the presence of a catalyst

LITERATURE.—Lange, *Zwischenprodukte*, #1363

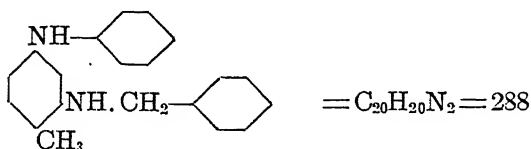
Dye Derived from Benzyl- $\alpha$ -naphthylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
654	OXAZINE DYE Nile Blue 2B		5-Diethylamino-2-nitroso-phenol	B

*N*<sup>3</sup>-Benzyl-*N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine (*C. A. nomen*  $NH_2=1$ )

Phenyl-*p*-amino-benzyl-*o*-toluidine ( $CH_3=1$ )

3-Benzylimino-4-methyl-diphenylamine



FORMATION.—4-*m*-Tolylene-diamine hydrochloride is melted with aniline at 220–270°, forming *N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine. This latter body upon being warmed with benzyl chloride with or without a diluent such as alcohol forms the benzyl-derivative desired

LITERATURE.—Lange, Zwischenprodukte, #1621, 1622, 1734

#### Dyes Derived from *N*<sup>3</sup>-Benzyl-*N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
684	AZINE DYES Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl- <i>o</i> -toluidine	B

**Beta =  $\beta$**

*Note.*—This is not considered in the alphabetical arrangement, e.g. beta-Naphthol is indexed as  $\beta$ -Naphthol under "N". However  $\beta$ -Naphthol is placed after  $\alpha$ -Naphthol

**Beta Acid**

*See*, Anthraquinone-2-sulfonic Acid

**Beta-Naphthol**

*See*,  $\beta$ -Naphthol under *N*

**Bi-compounds**

*See*, Di-compounds, *e.g.*, for binitro-benzol (or -benzene), *see* dinitro-benzene

*p*:*p'*-Bis(diethylamino)-benzohydrol (*C. A. nomen.*)

*See*, *p*:*p'*-Tetraethyl-diamino-benzohydrol

*p*:*p'*-Bis(diethylamino)-benzophenone (*C. A. nomen.*)

*See*, *p*:*p'*-Tetraethyl-diamino-benzophenone

*p*:*p'*-Bis(dimethylamino)-benzohydrol (*C. A. nomen.*)

*See*, Hydrol

*p*:*p'*-Bis(dimethylamino)-benzophenone (*C. A. nomen.*)

*See*, Ketone

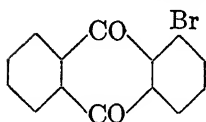
3:5-Bis[β-(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

*See*, Sulfo-*m*-tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)

**Broenner's Acid**

*See*, page 152

**1-Bromo-anthraquinone**



FORMATION.—From potassium salt of anthraquinone-1-sulfonic acid, by treatment with bromine and acid

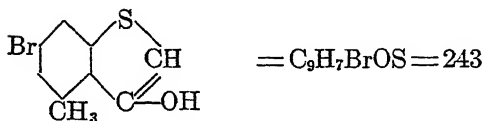
LITERATURE.—Lange, Zwischenprodukte, #3083

**Dye Derived from 1-Bromo-anthraquinone.**

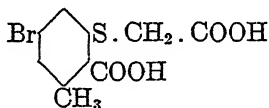
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
873	ANTHRAQUINONE AND ALLIED DYES Helindone +1 Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols) 1:4-Diamino-anthraquinone	V

**5-Bromo-2-hydroxyl-3-methyl-thionaphthene** (*C. A. and English numbering*)

**6-Bromo-3-hydroxyl-4-methyl-(1)-thionaphthene** (*German numbering*)



**FORMATION.**—4-Bromo-6-nitro-2-methyl-benzoic acid is reduced with  $\text{Na}_2\text{S}_2$ ; the amino-compound diazotized, and then treated with potassium xanthogenate (potassium ethyl xanthate). The xanthogenate compound upon being treated with chloro-acetic acid forms bromo-methyl-phenyl-thioglycol-*o*-carboxylic acid



This compound upon being fused with caustic alkali, forms the carboxylic acid of 5-bromo-2-hydroxy-3-methyl-thionaphthene. The carboxylic acid decomposes, evolving  $\text{CO}_2$ , when its solution is acidified and warmed

**LITERATURE.**—Lange, *Zwischenprodukte*, #2169

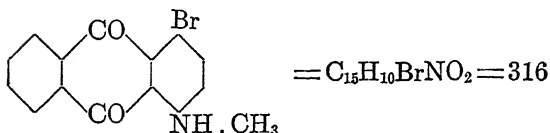
Georgievics and Grandmougin, *Dye Chemistry*, 433, 437

*Cf.* Cain, *Intermediate Products* (2d Ed.), 158, 159

### Dye Derived from 5-Bromo-2-hydroxyl-3-methyl-thionaphthene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
910	INDIGO GROUP DYE Helindone Pink BN	I '14:— 41,699 I '20:— 17,162	5-Bromo-2-hydroxyl-3-methyl-thionaphthene (2 mols) [Oxidation]	V

**I-Bromo-4-methylamino-anthraquinone**



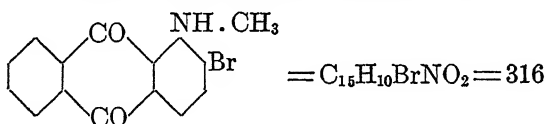
FORMATION.—From 1-methylamino-anthraquinone by treating its pyridine solution with bromine and warming on the water bath

LITERATURE.—Lange, Zwischenprodukte, #3190

**Dye Derived from 1-Bromo-4-methylamino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
856	ANTHRAQUINONE AND ALLIED DYES Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	<i>p</i> -Toluidine [Sulfonation] [? Classification]	ACr

**2-Bromo-1-methylamino-anthraquinone**

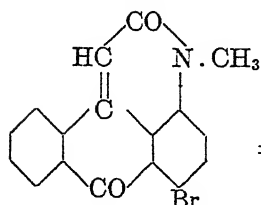


FORMATION.—From 1-amino-2-bromo-anthraquinone by methylation with dimethyl-sulfate

LITERATURE.—Lange, Zwischenprodukte, #3191

**Dye Derived from 2-Bromo-1-methylamino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
839	ANTHRAQUINONE AND ALLIED DYES Algol Blue K	I '14:—150 I '20:—218	2-Bromo-1-methylamino-anthraquinone (2 mols)	V

**4-Bromo-*N*-methyl-anthrapyridone**6-Bromo-3-methyl-3:7-*peri*-naphthoquinoline-2(3):7-dione (*C.A. nomen.*)

FORMATION.—(1) From 1-methylamino-anthraquinone, by acetylation of amino group, and condensation to the *N*-methyl-anthrapiyridone. Bromination of this latter compound in the 4 position results in 4-bromo-*N*-methyl-anthrapiyridone. (2) From 4-bromo-1-methylamino-anthraquinone by acetylation and closing the ring

LITERATURE.—Lange, Zwischenprodukte, #3609

Georgievics and Grandmougin, Dye Chemistry, 464–465

Ullmann, Enzy. tech. Chemie, 1, 192

**Dye Derived from 4-Bromo-*N*-methyl-anthrapiyridone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
825	ANTHRAQUINONE AND ALLIED DYES Algol Red B	I '14:— 2,399 I '20:— 4,151	2-Amino-anthraquinone	V

**6-Bromo-3-methyl-3:7-*peri*-naphthoquinoline-2(3):7-dione (*C.A. nomen.*)**

*See*, 4-Bromo-*N*-methyl-anthrapiyridone

**Broenner's Acid**

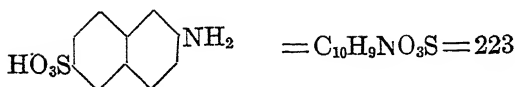
2-Naphthylamine-6-sulfonic Acid

6-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

Naphthylamine-sulfonic Acid Br.

$\beta$ -Naphthylamine- $\beta$ -sulfonic Acid

Amino-Schaeffer's Acid



STATISTICS.—Imported '14:—2,316 lbs.  
 Manufactured '18:— ?  
 Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—By heating the sodium salt of Schaeffer's Acid with concentrated ammonia in an autoclave at 180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 206  
 Lange, Zwischenprodukte, #2371–2376  
 Thorpe, Dic. Chemistry, 3, 601

**Dyes Derived from Broenner's Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
172	MONOAZO DYES Fast Brown 3B	I '14:— 1,477	<i>a</i> -Naphthol	A
174	Double Brilliant Scarlet G	I '14:—210,429 M '17:— ? M '20:— ?	<i>β</i> -Naphthol	A
176	Double Scarlet Extra S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Nevile-Winther's Acid	A
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Salicylic Acid or <i>o</i> -Cresotic Acid	M
230	DISAZO DYES Cloth Red 3G, 3GA	I '14:— 251	<i>o</i> -Amino-azo-toluene	M
302	Hessian Brilliant Purple		Diamino-stilbene- disulfonic Acid Broenner's Acid (2 mols)	D

Dyes Derived from Broenner's Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
316	Brilliant Congo G		Benzidine Amino-R Acid	D
357	Dianol Red B		Dichloro-benzidine Broenner's Acid (2 mols)	D
365	Benzo Purpurin B	I '14:— 21,090 M '17:— ? M '18:— ? M '19:— ?	Tolidine Broenner's Acid (2 mols)	D
366	Diamine Red B Delta Purpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine 2-Naphthylamine-7- sulfonic Acid	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Tolidine Amino-R Acid	D

**C Acid**

1: 5-Dihydroxy-naphthalene-2-sulfonic Acid

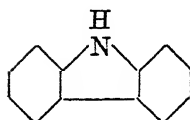
2-Naphthol-4: 8-disulfonic Acid

2-Naphthylamine-4: 8-disulfonic Acid

*(These intermediates not considered herein)***Carbazole**

Dibenzo-pyrrole

Diphenylene-imide





STATISTICS.—Imported '14:—very small

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—By extraction from coal-tar or crude anthracene

LITERATURE.—Ullmann, Enzy. tech. Chemie, 3, 274

Lange, Zwischenprodukte, page 308

**Dyes Derived from Carbazole**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
748	SULFUR DYE Hydron Blue	I '14:—296,723 I '20:— 19,210 M '20:— ?	<i>p</i> -Nitroso-phenol [S+Na <sub>2</sub> S]	V

**Carbolic Acid**

*See*, Phenol

**Carbonyl Chloride**

*See*, Phosgene

**2-Carboxy-5-chloro-phenyl-thioglycolic Acid**

*See*, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

***N*-(Carboxy-methyl)-anthranilic Acid (C. A. nomen.)**

*See*, Phenyl-glycine-*o*-carboxylic Acid

**2-(Carboxy-methyl-mercapto)-4-chloro-benzoic Acid (C. A. nomen.)**

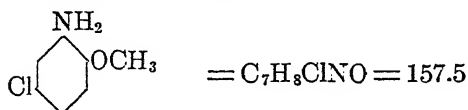
*See*, 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

**Cassella's Acid**

*See*, 2-Naphthol-7-sulfonic Acid

**Cassella's Acid F**

*See*, 2-Naphthylamine-7-sulfonic Acid

**Chi Acid***See*, Anthraquinone-1:8-disulfonic Acid**Chicago Acid***See*, 1-Amino-8-naphthol-2:4-disulfonic Acid**3-Chloro-aniline-2-sulfonic Acid***See*, 2-Amino-6-chloro-benzene-sulfonic Acid**5-Chloro-o-anisidine** ( $NH_2=1$ )

**FORMATION.**—1:4-Dichloro-3-nitro-benzene is boiled with caustic potash and methyl alcohol and the resulting chloro-nitro-anisol is reduced with iron and acetic acid

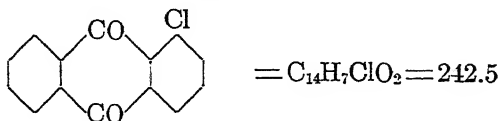
**LITERATURE.**—J. Soc. Chem. Ind. **21**, 610 (1902)

U. S. Pat. 695,812

Lange, Zwischenprodukte, #1034

**Dye Derived from 5-Chloro-o-anisidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
97	MONOAZO DYE Chloranisidine Scarlet		$\beta$ -Naphthol	MF

**I-Chloro-anthraquinone** (*C. A. nomen.*) $\alpha$ -Chloro-anthraquinone

**FORMATION.**—From potassium anthraquinone-1-sulfonate by treatment at 100° with chlorine and dilute hydrochloric acid

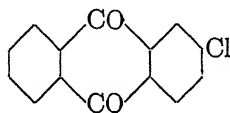
**LITERATURE.**—Lange, Zwischenprodukte, #3081, 3083, 3086

**Dye Derived from 1-Chloro-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
834	ANTHRAQUINONE AND ALLIED DYES Algol Gray B	I '14:— 4,192 I '20:— 890	1-Amino-anthraquinone [Nitration, Reduction]	V

**2-Chloro-anthraquinone** (*C. A. nomen.*)

$\beta$ -Chloro-anthraquinone



FORMATION.—(1) From sodium anthraquinone-2-sulfonate in aqueous solution, by adding hydrochloric acid, and by passing in chlorine until all the 2-chloro-anthraquinone is precipitated out. (2) From phthalic anhydride and chloro-benzene by first condensing in presence of  $AlCl_3$  to chloro-benzoyl-benzoic acid, and then by warming with sulfuric acid to 2-chloro-anthraquinone

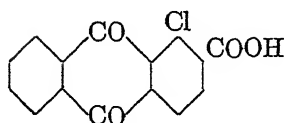
LITERATURE.—Lange, Zwischenprodukte, 3082, 3083

Ullmann, Enzy. tech. Chemie, 1, 472

**Dyes Derived from 2-Chloro-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
824	ANTHRAQUINONE AND ALLIED DYES Algol Orange R	I '14:— 51 I '20:— 406	1-Amino-anthraquinone	V
828	Indanthrene Bordeaux B	I '20:—2,741	2-Chloro-anthraquinone (2 mols) 1: 5-Diamino-anthraquinone	V
870	Algol Corinth R	I '29:— 134	1-Amino-anthraquinone [Nitration, Reduction] Benzoyl chloride	V

## 1-Chloro-anthraquinone-2-carboxylic Acid



$$= \text{C}_{15}\text{H}_7\text{ClO}_4 = 286.5$$

FORMATION.—2-Methyl-1-nitro-anthraquinone is treated with chlorine in nitro-benzene solution, whereby the nitro group is substituted by chlorine and the methyl group oxidized, thus forming 1-chloro-anthraquinone-2-carboxylic acid

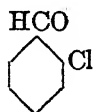
LITERATURE.—Lange, Zwischenprodukte, #3171

Ullmann, Enzy tech. Chemie, 1, 484

## Dye Derived from 1-Chloro-anthraquinone-2-carboxylic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
831	ANTHRAQUINONE AND ALLIED DYES Indanthrene Red BN	I '14:—6,056 I '20:—4,766	$\beta$ -Naphthylamine	V

## o-Chloro-benzaldehyde



$$= \text{C}_7\text{H}_5\text{ClO} = 140.5$$

STATISTICS.—Manufactured '20:— ?

FORMATION.—From o-chloro-benzyl alcohol by oxidation with nitric acid in a sulphuric acid solution at about 40° C.

LITERATURE.—J. Soc. Chem. Ind. 18, 576 (1899)

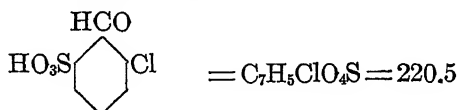
Lange, Zwischenprodukte, #179-184

Dyes Derived from *o*-Chloro-benzaldehyde

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
496	TRIPHENYL-METHANE-DYES Setoglaurine	I '20:— 1,102	Dimethyl-aniline (2 mols) [Oxidation]	B
500	Setocyanine O	I '14:— 923 I '20:— 1,102	Ethyl- <i>o</i> -toluidine (2 mols) [Oxidation]	B
503	Night Green A Neptune Green Brilliant Milling Green B	I '14:— 40,868 M '19:— ? I '20:— 10,940 M '20:— ?	Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
551	Eriochrome AzuroI B	I '14:— 21,060 I '20:— 7,275	<i>o</i> -Cresotic acid (2 mols) [Oxidation]	ACr

2-Chloro-benzaldehyde-6-sulfonic Acid

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)

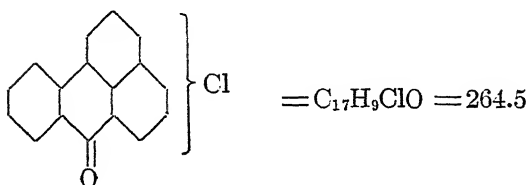


FORMATION.—(1) 1:3-Dichloro-2-benzaldehyde is treated with one mol of sodium sulfite under pressure. (2) 3-Chloro-2-toluene-1-sulfonic acid is oxidized with manganese dioxide and sulfuric acid

LITERATURE.—Lange, *Zwischenprodukte*, #710

Dye Derived from 2-Chloro-benzaldehyde-6-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
554	TRIPHENYL-METHANE DYE Chrome AzuroI S	I '14:— 2,469 I '20:— 551	<i>o</i> -Cresotic Acid (2 mols) [Oxidation]	ACr

**?-Chloro-7-meso-benzanthren-7-one** (*C. A. nomen.*)*See*, Chloro-benzanthrone**Chloro-benzanthrone****?-Chloro-7-meso-benzanthren-7-one** (*C. A. nomen.*)

STATISTICS.—Manufactured '19:— ?

FORMATION.—From benzanthrone in acetic acid solution by treatment with chlorine

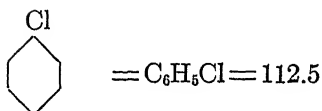
LITERATURE.—Addition #6719 to French Patent 349,531 of Oct. 1,1906

**Dyes Derived from Chloro-benzanthrone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
766	Indanthrene Violet R	I '14:— 1,590 M '19:— ? I '20:— 941	Chloro-benzanthrone (2 mols)	V
767	Indanthrene Violet 2R	I '14:— 68,419 I '20:— 40,782 M '20:— ?	Chloro-benzanthrone (2 mols) [Dichlorination] [or Indanthrene Violet R, chlorinated]	V
768	Indanthrene Violet B	I '20:— 84,165(?)	Chloro-benzanthrone (2 mols) [Dibromination] [or Indanthrene Violet R, brominated]	V

**Chloro-benzene** (*C. A. nomen.*)

Monochlor-benzene



STATISTICS.—Manufactured 1917:—24,624,099 lbs.

Manufactured 1918:—20,530,639 lbs.

Manufactured 1919:— 4,116,666 lbs.

Manufactured 1920:— 4,829,142 lbs.

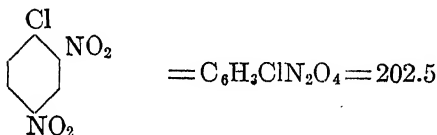
FORMATION.—By passing chlorine through benzene in the presence of a catalyst (iron) and at a relatively low temperature

LITERATURE.—Cain, Intermediate Products (2d Ed.), 6-11  
Lange, Zwischenprodukte, #2

Uses.—For technical preparation of *o*- and *p*-chloro-nitro-benzene, chloro-dinitro-benzene, *o*-amino-phenol-*p*-sulfonic acid and many other intermediates

**1-Chloro-2:4-dinitro-benzene** (*C. A. nomen.*)

2:4-Dinitro-chloro-benzene



STATISTICS.—Manufactured 1917:—6,078,637 lbs.

Manufactured 1918:— ?

Manufactured 1919:—4,428,730 lbs.

Manufactured 1920:—5,947,791 lbs.

FORMATION.—From chloro-benzene by dinitration with mixed nitric and sulphuric acids

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14  
Lange, Zwischenprodukte, #723

## Dyes Derived from 1-Chloro-2:4-dinitro-benzene

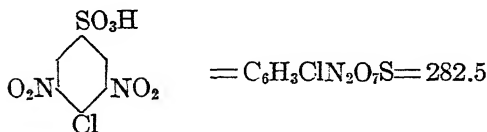
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
724	SULFUR DYES Immedial Black	I '14:— 54,696 M '18:— ?	<i>p</i> -Amino-phenol [S+Na <sub>2</sub> S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	<i>p</i> -Amino-phenol [NaOH; S+Na <sub>2</sub> S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	<i>p</i> -Amino-phenol [Alcohol; S+Na <sub>2</sub> S]	S
727	Auronal Black B		<i>p</i> -Phenylene-diamine [Glycerol; S+Na <sub>2</sub> S]	S
738	Cotton Black		Sulfanilic or Metanilic acid [S+Na <sub>2</sub> S]	S

## 1-Chloro-2:6-dinitro-benzene-4-sulfonic Acid

See, 4-Chloro-3:5-dinitro-benzene-sulfonic Acid

4-Chloro-3:5-dinitro-benzene-sulfonic Acid (*C. A. nomen.*)

I-Chloro-2:6-dinitro-benzene-4-sulfonic Acid



FORMATION.—34 Parts of chloro-benzene are dissolved in a mixture of 72 parts of monohydrate and 30 parts of 25% oleum, by aid of heat. When cold, there is added 26 parts of 87% nitric acid which causes the temperature to rise to 40° where it is held for 2 hours. Then a further addition of oleum is made,—100 parts of 60% followed by 40 parts of potassium nitrate, and the mixture heated for several hours at 120–130°.

LITERATURE.—Lange, Zwischenprodukte, #1037



Dye Derived from 4-Chloro-3:5-dinitro-benzene-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
542	TRIPHENYL-METHANE DYE Agalma Green B	I '14:— 2,294	Hydrol Metanilic acid [Oxidation]	A

3-Chloro-2-formyl-benzene-sulfonic Acid (*C. A. nomen.*)

See, 2-Chloro-benzaldehyde-6-sulfonic Acid

Chloro-H Acid

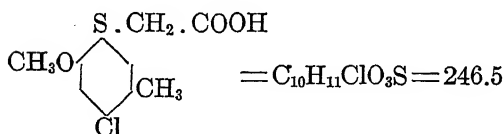
See, 1-Chloro-8-naphthol-3:6-disulfonic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

See, 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid

(4-Chloro-6-methoxy-3-methyl-phenyl-mercapto)-acetic Acid  
(*C. A. nomen.*)



FORMATION.—4-Chloro-6-methoxy-*m*-toluidine ( $\text{NH}_2=1$ ) is dissolved in hydrochloric acid and diazotized. The diazo solution, warmed to  $70^\circ$ , is introduced into an alkaline solution of potassium xanthate ( $\text{C}_2\text{H}_5\text{O} \cdot \text{CS} \cdot \text{SK}$ ), the condensation product extracted and saponified to the mercaptan. The mercaptan is reacted with chloro-acetic acid, forming the above thioglycolic acid

LITERATURE.—Ger. Pat. 245,544; 241,910

Frdl. 10, 507, 502

Lange, Zwischenprodukte, #1043, 688

Cf. Georgievics and Grandmougin, Dye Chemistry, 436-7

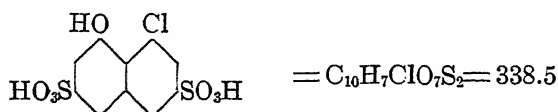
**Dye Derived from 4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
920	INDIGO GROUP DYE Helindone Violet BB	I '14:— 28,607 I '20:— 16,882	4-Chloro-6-methoxy-3-methyl-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid]	V

**1-Chloro-8-naphthol-3:6-disulfonic Acid**

8-Chloro-1-naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

Chloro-H Acid



STATISTICS.—Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—H acid is diazotized; and the yellow diazo body is filtered off, mixed with 10 per cent hydrochloric acid, cooled to 10°, and a solution of cuprous chloride added. This product is now heated to complete the reaction, purified, and the chloro-body isolated. (Sandmeyer Reaction)

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 238

Lange, *Zwischenprodukte*, #2451, 2671

Thorpe, *Dic. Chemistry*, 3, 628

**Dyes Derived from 1-Chloro-8-naphthol-3:6-disulfonic Acid]**

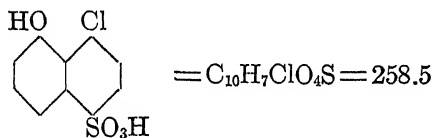
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
119	MONOAZO DYE Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio- <i>p</i> - toluidine	D
418	DISAZO DYE Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	Dianisidine 1-Chloro-8-naphthol- 3:6-disulfonic Acid (2 mols)	D

**8-Chloro-1-naphthol-3:6-disulfonic Acid (*C. A. nomen.*)**

*See, 1-Chloro-8-naphthol-3:6-disulfonic Acid*

**1-Chloro-8-naphthol-4-sulfonic Acid**

8-Chloro-1-naphthol-5-sulfonic Acid (*C. A. nomen.*)



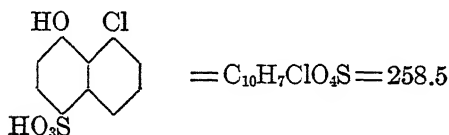
**FORMATION.**—1-Chloro-naphthalene-4-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-4-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid and the boiling continued until the nitrogen evolution ceases

**LITERATURE.**—Eng. Pat., 12085 of 1898

*Cf. Lange, Zwischenprodukte, #2451*

**Dye Derived from 1-Chloro-8-naphthol-4-sulfonic acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
417	DISAZO DYE Chlorazol Blue R	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

**1-Chloro-8-naphthol-5-sulfonic Acid**8-Chloro-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)

**FORMATION.**—1-Chloro-naphthalene-5-sulfonic acid is nitrated and reduced, forming 1-chloro-8-naphthylamine-5-sulfonic acid; which is diazotized and added slowly to a boiling hot solution of 10 per cent sulfuric acid, and the boiling continued until the evolution of nitrogen ceases.

**LITERATURE.**—Eng. Pat., 12085 of 1898

Cf. Lange, Zwischenprodukte, #2451

**Dye Derived from 1-Chloro-8-naphthol-5-sulfonic acid**

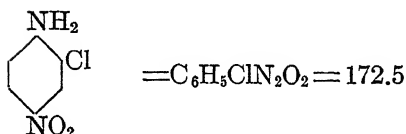
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
417	DISAZO DYE Chlorazol Blue 3G	I '14:— 10,151	Dianisidine 1-Chloro-8-naphthol-5-sulfonic Acid (2 mols)	D

**8-Chloro-1-naphthol-4-sulfonic Acid (*C. A. nomen.*)**

See, 1-Chloro-8-naphthol-5-sulfonic Acid

**8-Chloro-1-naphthol-5-sulfonic Acid** (*C. A. nomen.*)*See*, 1-Chloro-8-naphthol-4-sulfonic Acid**1-Chloro-3-nitro-6-aniline***See*, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)**2-Chloro-4-nitro-aniline** (*C. A. nomen.*)*o*-Chloro-*p*-nitro-aniline

1-Chloro-3-nitro-6-aniline



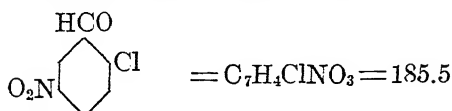
FORMATION.—*p*-Nitro-aniline is dissolved in concentrated hydrochloric acid or in sulfuric acid, ice added to cool under 0°, and chlorine is conducted into the solution under 0°, until the proper increase in weight has taken place

LITERATURE.—Lange, *Zwischenprodukte*, #724

**Dyes Derived from 2-Chloro-4-nitro-aniline**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
467	FRISAZO DYES Diphenyl Green G	I '20:— 2,205	Benzidine Phenol H Acid	D
468	Diphenyl Green 3G		Benzidine Salicylic Acid H Acid	D

***o*-Chloro-*p*-nitro-aniline***See*, 2-Chloro-4-nitro-aniline (*C. A. nomen.*)

**2-Chloro-5-nitro-benzaldehyde**

FORMATION.—*o*-Chloro-benzaldehyde is dissolved in sulfuric acid, and nitrated cold with mixed acid

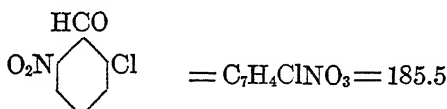
LITERATURE.—Beil., III, 16

**Dye Derived from 2-Chloro-5-nitro-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
552	TREPHENYL-METHANE DYE Chromal Blue G	I '14:— 1,335	<i>o</i> -Cresotic Acid (2 mols) [Oxidation]	M

**2-Chloro-6-nitro-benzaldehyde (C. A. nomen.)**

*o*-Chloro-*o*-nitro-benzaldehyde



FORMATION.—This can be prepared from 2-chloro-6-nitro-benzyl bromide by action of strong nitric acid, or from 2-chloro-6-nitro-benzyl alcohol by oxidation

LITERATURE.—Lange, Zwischenprodukte, #699  
Beil. III., spl. 11

**Dye Derived from 2-Chloro-6-nitro-benzaldehyde**

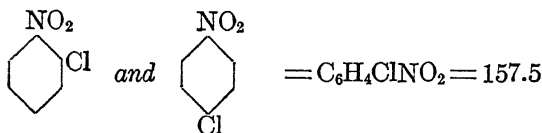
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
887	INDIGO GROUP DYES Brilliant Indigo BASF/4G	I '20:— 1,207	2-Chloro-6-nitro-benzaldehyde (2 mols) [Acetone; Bromination]	V

***o*-Chloro-*o*-nitro-benzaldehyde**

*See*, 2-Chloro-6-nitro-benzaldehyde (*C. A. nomen.*)

***o*- and *p*-Chloro-nitro-benzenes (*C. A. nomen.*)**

*o*- and *p*-Nitro-chloro-benzenes



STATISTICS.—	<i>Mixed</i>	<i>orth.</i>	<i>para</i>
Manufactured 1917:—	602,192 lbs.		
Manufactured 1918:—	?		
Manufactured 1919:—	2,520,991 lbs.		
Manufactured 1920:—		349,386 lbs.	959,405 lbs.

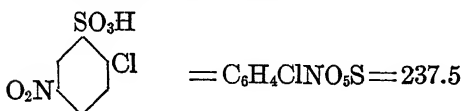
**FORMATION.**—Chloro-benzene, upon being nitrated, gives a mixture of about 30 per cent of *o*-chloro-nitro-benzene and about 70 per cent of *p*-chloro-nitro-benzene. The separation is carried out by alternate crystallization (of the *p*-compound) and fractional distillation

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 11–13  
Lange, *Zwischenprodukte*, #193, 194

**USES.**—*o*-Chloro-nitro-benzene is employed for preparation of *o*-nitro-anisole, which in turn leads to *o*-anisidine and dianisidine. It is also used for 4-chloro-3-nitro-benzene-sulfonic acid

*p*-Chloro-nitro-benzene is employed for preparation of substituted diphenylamines (Sulfur Dyes), and for 2-chloro-5-nitro-benzene-sulfonic acid

**2-Chloro-5-nitro-benzene-sulfonic Acid**



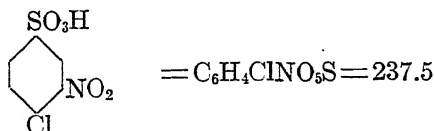
**STATISTICS.**—Manufactured 1920:— ?

**FORMATION.**—By sulfonation of *p*-chloro-nitro-benzene with 10–12 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14

USES.—For preparation of 4-nitro-aniline-2-sulfonic acid (*p*-nitro-aniline-*o*-sulfonic acid)

**4-Chloro-3-nitro-benzene-sulfonic Acid**



FORMATION.—By sulfonation of *o*-chloro-nitro-benzene with 5 parts of 30 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 13

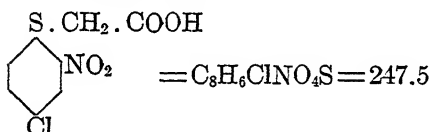
USES.—For preparation of aniline-2:5-disulfonic acid

**(4-Chloro-2-nitro-phenyl-mercapto)-acetic Acid** (*C. A. nomen.*)

See 4-Chloro-2-nitro-phenyl-thioglycolic Acid

**4-Chloro-2-nitro-phenyl-thioglycolic Acid**

(4-Chloro-2-nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)



FORMATION.—(1) 4-Chloro-2-nitro-phenyl-mercaptan is reacted with chloro-acetic acid in an alkaline solution. (2) Probably also by reacting the nitro-derivative of *p*-dichloro-benzene (1:4-dichloro-3-nitro-benzene) with thioglycolic acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #2171, 611, 1041, 674

**Dye Derived from 4-Chloro-2-nitro-phenyl-thioglycolic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
921	INDIGO GROUP DYES Helindone Gray BR, 2B	I '14:—470 I '20:—508	4-Chloro-2-nitro-phenyl-thioglycolic acid (2 mols) [Chloro-sulfonic acid; Reduction]	V



***o*-Chloro-*p*-nitro-toluene** (*C. A. nomen.*)

*See, p*-Nitro-benzyl Chloride

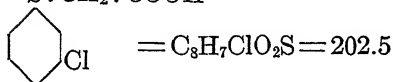
**(*m*-Chloro-phenyl-mercapto)-acetic Acid** (*C. A. nomen.*)

*See, m*-Chloro-phenyl-thioglycolic Acid

***m*-Chloro-phenyl-thioglycolic Acid**

(*m*-Chloro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

S. CH<sub>2</sub>. COOH



FORMATION.—*m*-Chloro-aniline is diazotized, coupled with potassium xanthate (C<sub>2</sub>H<sub>5</sub>O . CS . SK), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #688

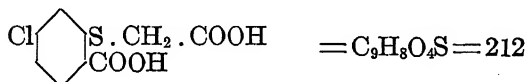
**Dye Derived from *m*-Chloro-phenyl-thioglycolic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
917	INDIGO GROUP DYES Helindone Red B	I '14:—100 I '20:—200	<i>m</i> -Chloro-phenyl-thioglycolic Acid (2 mols) [Oleum Condensation]	V

**5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid**

2-Carboxy-5-chloro-phenyl-thioglycolic Acid

2-(Carboxy-methyl-mercapto)-4-chloro-benzoic Acid (*C. A. nomen.*)



FORMATION.—4-Chloro-anthranilic acid is diazotized, and reacted with potassium ethyl xanthate, and then with chloro-acetic acid, resulting in the formation of the chloro-phenyl-thioglycol-*o*-carboxy acid

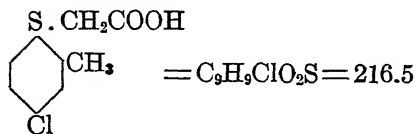
LITERATURE.—Lange, Zwischenprodukte, #2170; *cf.* #518

Dye Derived from 5-Chloro-phenyl-thioglycol-*o*-carboxylic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
909	INDIGO GROUP DYE Ciba Red B		5-Chloro-phenyl-thioglycol- <i>o</i> -carboxylic acid (2 mols)	V

*α*-Chloro-toluene (*C. A. nomen.*)*See*, Benzyl Chloride2-Chloro-5-toluidine-4-sulfonic Acid ( $\text{CH}_3=1$ )*See*, 2-Amino-5-chloro-*p*-toluene-sulfonic Acid (*C. A. nomen.*  
 $\text{SO}_3\text{H}=1$ )(4-Chloro-*o*-tolyl-mercapto)-acetic Acid (*C. A. nomen.*)*See*, 4-Chloro-2-tolyl-thioglycolic Acid

4-Chloro-2-tolyl-thioglycolic Acid

(4-Chloro-*o*-tolyl-mercapto)-acetic Acid (*C. A. nomen.*)

FORMATION.—4-Chloro-*o*-toluidine ( $\text{NH}_2=1$ ) is diazotized, coupled with potassium xanthate ( $\text{C}_2\text{H}_5\text{O} \cdot \text{CS} \cdot \text{SK}$ ), hydrolyzed to the mercapto-derivative, and condensed with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #688

*Cf.* Geogievics and Grandmougin, *Dye Chemistry*, 437

Dye Derived from 4-Chloro-2-tolyl-thioglycolic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
918	INDIGO GROUP DYE Helindone Red 3B	I '14:— 27,874 I '20:— 4,385	4-Chloro-2-tolyl-thioglycolic Acid (2 mols) [Oleum Condensation] [There is some question as to the Cl- and CH <sub>3</sub> - positions of that chloro-tolyl-thioglycolic acid used]	V

**Chromogen I**

*See, Chromotropic Acid*

**Chromotrope Acid**

*See, Chromotropic Acid*

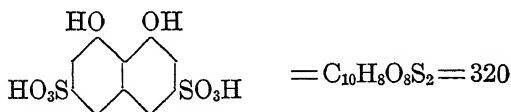
**Chromotropic Acid**

1: 8-Dihydroxy-naphthalene-3: 6-disulfonic Acid

4: 5-Dihydroxy-2: 7-naphthalene-disulfonic Acid (*C. A. nomen.*)

Chromotrope Acid

Chromogen I



STATISTICS.—Manufactured '18:— ?

Manufactured '19:—164,654 lbs.

Manufactured '20:—152,352 lbs.

FORMATION.—(1) From 1-Naphthol-3: 6: 8-trisulfonic acid by fusion of the sodium salt of this acid with caustic soda at 170–220°.

(2) From H acid by heating with a dilute caustic soda solution in an autoclave at about 265°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 232

Lange, Zwischenprodukte, #2775, 2670

## Dyes Derived from Chromotropic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
40	MONOAZO DYES Chromotrope 2R	I '14:— 5,000 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Aniline	A
57	Chromotrope 2B	I '14:— 7,970 M '18:— ? M '19:— ? M '20:— ?	<i>p</i> -Nitro-aniline	ACr
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:— 105,086 I '20:— 2,182 M '20:— ?	<i>p</i> -Phenylene-diamine actually from <i>p</i> -Nitro-aniline and Reduction or <i>p</i> -Amino-acetanilide and Saponification	A
67	Chromotrope 6B	I '14:— 2,818 M '17:— ? M '18:— ? M '19:— 77,481 M '20:— ?	<i>p</i> -Amino-acetanilide	A
114	Chromotrope 10B	M '19:— ?	$\alpha$ -Naphthylamine	A
129	Chromazone Red A	I '14:— 243	<i>p</i> -Amino-benzaldehyde	M
130	Chromazone Blue R		<i>p</i> -Amino-benzaldehyde Ethyl-phenyl-hydra- zine or <i>p</i> -Amino-benzylidene- ethyl-phenyl-hydra- zone	M
171	Chromotrope 8B	M '18:— ?	Naphthionic Acid	A

Dyes Derived from Chromotropic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
292	DISAZO DYES Acid Alizarine Black I		<i>p</i> -Phenylene-diamine Salicylic Acid	M
323	Dianil Blue R	M '20:— ?	Benzidine Chromotropic Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Nevile-Winther's Acid	D
380	Dianil Blue B		Tolidine Chromotropic Acid (2 mols)	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Dianisidine Chromotropic Acid (2 mols)	D
479	TRISAZO DYE Dianil Black R		Benzidine Naphthionic Acid <i>m</i> -Phenylene-diamine	D
777	ANTHRAQUINONE AND ALLIED DYES Chromogen I		[Oxidation on fiber]	ACr

**Chrysazin**

1: 8-Dihydroxy-anthraquinone (*not considered herein*)

**Chryseic Acid**

4-Nitro-1-naphthol (*not considered herein*)

**Cincholepidine**

*See, Lepidine*

**Cleve's Acid**

*See, 1-Naphthol-5-sulfonic Acid*

*See, 1-Naphthylamine-6-sulfonic Acid*

*See, 1-Naphthylamine-7-sulfonic Acid*

**Cleves  $\alpha$  Acid**

*See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)*

**Cleve's  $\beta$  Acid**

*See, 1-Naphthylamine-6-sulfonic Acid*

*Also applied to 1-Nitro-naphthalene-6-sulfonic acid*

**Cleve's  $\gamma$  Acid**

1-Naphthylamine-3-sulfonic Acid (*not considered herein*)

**Cleve's  $\delta$  Acid**

*See, 1-Naphthylamine-7-sulfonic Acid*

*This trivial name also applied to*

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

**Cleve's  $\theta$  Acid**

*See, 1-Naphthylamine-7-sulfonic Acid*

*This trivial name also applied to*

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

**Cleve's Acids**

*See, 1-Naphthylamine-6-and-7-sulfonic Acids*

**Cleve's  $\alpha$ -Nitro-naphthalene-sulfonic Acid**

1-Nitro-naphthalene-5-sulfonic Acid (*not considered herein*)

**Cleve's  $\gamma$ -Nitro-naphthalene-sulfonic Acid**

1-Nitro-naphthalene-3-sulfonic Acid (*not considered herein*)

**Cleve's  $\delta$ -Nitro-naphthalene-sulfonic Acid**

1-Nitro-naphthalene-8-sulfonic Acid (*not considered herein*)

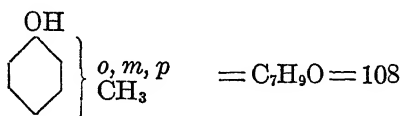
**Cleve's  $\theta$ -Nitro-naphthalene-sulfonic Acid**

1-Nitro-naphthalene-6-sulfonic Acid (*not considered herein*)

1-Nitro-naphthalene-7-sulfonic Acid (*not considered herein*)

**Cresol**

*Note.*—C. A. practice is to start the numbering of cresols from the OH group unless there is present a substituent of "higher order" as  $\text{SO}_3\text{H}$ . European practice is generally to start numbering with  $\text{CH}_3$



STATISTICS.—Imported '14:—245,835 lbs.

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—Extracted from coal tar

LITERATURE.—Lange, Zwischenprodukte, #438-452

**Dye Derived from Cresol**

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
311	DISAZO DYE Orange TA	I '14:—602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Naphthionic Acid	D

**2:3-Cresotic Acid (C. A. nomen.)**

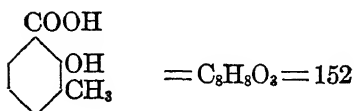
*See, o-Cresotic Acid*

**o-Cresotic Acid**

o-Cresotinic Acid

2:3-Cresotic Acid (C. A. nomen.)

o-Homo-salicylic Acid



STATISTICS.—Imported '14:—very small

Manufactured '20:— ?

FORMATION.—By dissolving *o*-cresol in caustic soda, evaporating to a dry powder; then by treating this powder with carbon dioxide under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153

Lange, Zwischenprodukte, #775

### Dyes Derived from *o*-Cresotic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
177	MONOAZO DYE Chrome Yellow D		Broenner's Acid	M
351	DISAZO DYES Cresotine Yellow G	I '14:— 1,748 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine <i>o</i> -Cresotic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	Tolidine 4: 6-Diamino- <i>m</i> - toluene-sulfonic Acid	D
395	Cresotine Yellow R		Tolidine <i>o</i> -Cresotic acid (2 mols)	D
551	TRIPHENYL- METHANE DYES Eriochrome Azuro B	I '14:— 21,060 I '20:— 7,275	<i>o</i> -Chloro-benzaldehyde [or other halogen] <i>o</i> -Cresotic Acid (2 mols) [Oxidation]	ACr
552	Chromal Blue G	I '14:— 1,335	2-Chloro-5-nitro-ben- zaldehyde <i>o</i> -Cresotic Acid (2 mols) [Oxidation]	M



Dyes Derived from *o*-Cresotic Acid (*continued*)

<i>Schultz Number or Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
553	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
	Eriochrome Cyanine R	I '14:— 2,249 I '20:— 2,205	Benzaldehyde- <i>o</i> -sulfonic Acid <i>o</i> -Cresotic Acid (2 mols) [Oxidation]	ACr
554	Chrome Azurol S	I '14:— 2,469 I '20:— 551	2-Chloro-benzaldehyde-6-sulfonic Acid <i>o</i> -Cresotic Acid (2 mols) [Oxidation]	ACr

*o*-Cresotinic Acid*See, o*-Cresotic Acid

## Croceine Acid

2-Naphthol-8-sulfonic Acid (*C. A. nomen.*)

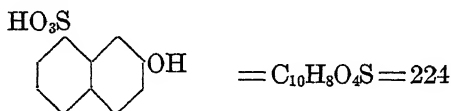
Bayer's Acid

 $\beta$ -Naphthol-sulfonic Acid B (*of Schultz*) $\beta$ -Naphthol- $\alpha$ -sulfonic Acid (*of Bayer & Co.'s Patents*)

Croceine Sulfonic Acid

*o*-Acid (*of Claus and Voltz*)<sup>1</sup>

Rumpff Acid



STATISTICS.—Manufactured 1919:— ?

Manufactured 1920:— ?

FORMATION.— $\beta$ -Naphthol is sulfonated at a low temperature, forming mostly croceine acid, but accompanied by some Schaeffer's acid.

They are generally separated by crystallization of their salts

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 225Lange, *Zwischenprodukte*, #2435-2439Thorpe, *Dic. Chemistry*, 3, 625<sup>1</sup> Claus and Voltz incorrectly assigned to this acid the constitution, 2-naphthol-3-sulfonic acid.

## Dyes Derived from Croceine Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
167	MONOAZO DYES Croceine Scarlet 3 BX	I '14:— 3,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 650 M '20:— ?	Naphthionic Acid	A
249	DISAZO DYES Croceine Scarlet 3B	I '14:— 9,613	Amino-azo-benzene- sulfonic Acid	A
251	Croceine Scarlet O	I '20:— 100	Amino-azo-benzene- disulfonic Acid	A
255	Croceine Scarlet 8B Ponceau 6 RB	I '14:— 2,379 I '20:— 154	Amino-azo-toluene- sulfonic Acid	A
259	Ponceau 10 RB	I '14:— 201	Sulfanilic Acid <i>o</i> -Anisidine	A
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Naphthionic Acid	D
320	Bordeaux	I '14:— 1,335 M '18:— ? M '19:— ? M '20:— ?	Benzidine Croceine Acid (2 mols)	D
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine 1-Naphthol-4: 8- disulfonic Acid	D
324	Chicago Blue 4R	I '14:— 1,199	Benzidine 1-Amino-8-naphthol-4- sulfonic Acid	D

**Dyes Derived from Croceine Acid** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
384	DISAZO DYES ( <i>continued</i> ) Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Tolidine 1-Amino-8-naphthol-4- sulfonic Acid	D
420	Azidine Wool Blue B		Dianisidine 1-Amino-8-naphthol-4- sulfonic Acid	D

**Croceine-sulfonic Acid**

*See, Croceine Acid*

ψ **Cumidine**

*See, Pseudocumidine (C. A. nomen.)*

**Dahl's Acid**

*See, 2-Naphthylamine-5-sulfonic Acid*

**Dahl's Acid II**

*See, 1-Naphthylamine-4:6-disulfonic Acid*

**Dahl's Acid III**

*See, 1-Naphthylamine-4:7-disulfonic Acid*

**Dahl's Acids**

1-Naphthol-4:6-and-4:7-disulfonic Acids (*not considered herein*)

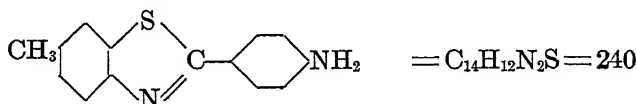
**Dehydro-thio-*p*-toluidine**

IV-Amino-5-methyl-2-phenyl-thiazol

Amino-benzenyl-*o*-amino-thio-cresol

*p*-Amino-phenyl-toluthiazole

1-(*p*-Amino-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)



FORMATION.—By heating together  $3\frac{1}{3}$  parts of *p*-toluidine with 1 part of sulfur, gradually raising the temperature to the boiling point, and finally fractionally distilling off the dehydro-thio-*p*-toluidine in a vacuum

LITERATURE.—Cain, *Intermediates* (2d Ed.), 77

Lange, *Zwischenprodukte*, #2219–2223

**Dyes Derived from Dehydro-thio-*p*-toluidine**

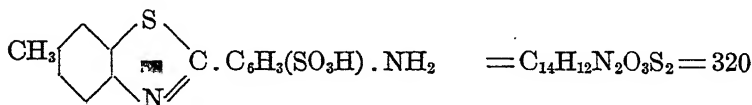
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
117	MONOAZO DYES Erica 2GN	I '14:— 1,171 M '19:— ? I '20:— 337	1-Naphthol-3:8-disulfonic Acid	D
118	Geranine Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	1-Naphthol-4:8-disulfonic Acid or 1-Naphthol-3-sulfonic Acid or 1:8-Dihydroxynaphthalene-4-sulfonic Acid	D
119	Diamine Rose	I '14:— 5,269 M '18:— ? M '19:— ? M '20:— ?	1-Chloro-8-naphthol-3:6-disulfonic Acid	D
614	THIOBENZENYL DYES Chromine G	I '14:— 1,001	[Sulfur, Methylation, Sulfonation]	D
618	Thioflavine T	I '14:— 35,224 I '20:— 5,807	[Methylation]	B

**Dehydro-thio-*p*-toluidine-sulfonic Acid**

IV-Amino-5-methyl-2-phenyl-thiazol-sulfonic Acid

DTS (*abbreviation for above in compounds, less NH<sub>2</sub>*)

1-(4-Amino-?-sulfo-phenyl)-5-methyl-benzothiazole (*C. A. nomen.*)



STATISTICS.—Manufactured '19:— ?

Manufactured '20:—51,961 lbs.

FORMATION.—By sulfonation of the "primuline melt" (from *p*-toluidine and sulfur), and purification from the primuline-sulfonic acid also formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 78

Lange, Zwischenprodukte, #2237

Ullmann, Enzy. tech. Chemie, 3, 677

**Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid**

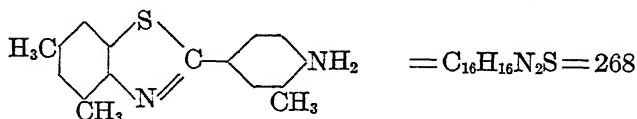
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
16	STILBENE DYES Curcuphenine		Dehydro-thio- <i>p</i> -toluidine-sulfonic Acid (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid (4 mols)	D
17	Chlorophenine		Dehydro-thio- <i>p</i> -toluidine-sulfonic Acid (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid (4 mols) [Reduction]	D
18	Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Dehydro-thio- <i>p</i> -toluidine-sulfonic Acid (2 mols) Dinitro-dibenzyl-disulfonic Acid <i>or</i> Dinitro-stilbene-disulfonic Acid	D
51	MONOAZO DYES Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	<i>p</i> -Nitro-aniline	D
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	<i>m</i> -Phenylene-diamine	D
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	β-Naphthol	A

Dyes Derived from Dehydro-thio-*p*-toluidine-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	MONOAZO DYES ( <i>continued</i> )			
194	Rosophenine 10B Thiazine Red R	I '14:— 3,077 M '19:— ? M '20:— ?	Nevile-Winther's Acid	D
196	Titan Red	I '14:— 886 M '19:— ? M '20:— ?	Schaeffer's Acid	D
198	Clayton Yellow Thiazol Yellow Mimosa C	I '14:— 29,879 M '18:— ? M '19:— ? I '20:— 11,182 M '20:— ?	Dehydro-thio- <i>p</i> -toluidine-sulfonic Acid (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Salicylic Acid	D
	DISAZO DYE			
209	Terracotta FC	I '14:— 551	Naphthionic Acid <i>m</i> -Phenylene-diamine	D
350	Alkali Yellow R		Benzidine Salicylic Acid	D
	THIOBENZENYL DYE			
617	Chloramine Yellow Diamine Fast Yellow Columbia Yellow	I '14:—180,497 M '17:— ? M '18:—123,816 M '19:— 54,077 I '20:— 4,810 M '20:—100,248	[Oxidation]	D

Dehydro-thio-*m*-xylidine

IV-Amino-2-phenyl-5:7:III-trimethyl-thiazol

1-(4-Amino-*m*-tolyl)-3:5-dimethyl-benzothiazole (*C. A. nomen.*)

STATISTICS.—Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—From *m*-xylidine and sulfur by heating to the boiling point until there is no further evolution of hydrogen sulfide; and by separating by distillation from the excess *m*-xylidine, and by solution in 30% hydrochloric acid from the *iso*-dehydro-thio-*m*-xylidine

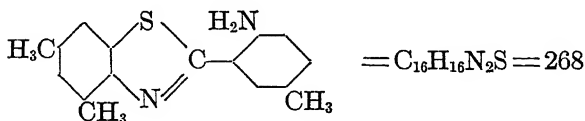
LITERATURE.—Lange, *Zwischenprodukte*, #2232  
 Cain, *Intermediate Products* (2d Ed.), 80  
 Anschütz and Schultz, *Ber.*, **22**, 582 (1889)  
 Paul, *Zeitsch. angew. Chem.*, **9**, 679 (1896)

**Dyes Derived from Dehydro-thio-*m*-xylidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
120	MONOAZO DYES Salmon Red	M '20:— ?	Amino-R Acid	D
121	Erica B	I '14:— 5,349 I '20:— 2,393 M '19:— ?	1-Naphthol-3: 8-disulfonic Acid	D
122	Erica G	I '14:— 2,370 I '20:— 1,142 M '18:— ?	G Acid	D

***iso*-Dehydro-thio-*m*-xylidine**

1-(6-Amino-*m*-tolyl)-3: 5-dimethyl-benzothiazole (*C. A. nomen.*)



FORMATION.—As a by-product in the manufacture of dehydro-thio-*m*-xylidine (see dehydro-thio-*m*-xylidine)

LITERATURE.—See dehydro-thio-*m*-xylidine  
 Heumann, *Anilinefarben*, **4**, 752

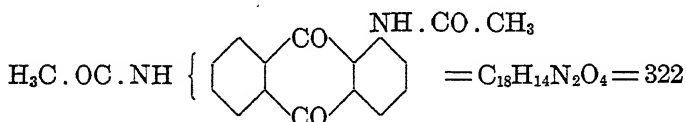
Dyes Derived from iso-Dehydro-thio-*m*-xylidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
123	MONOAZO DYE Emine Red		Schaeffer's Acid	A

## Delta Acid

See, 1-Naphthylamine-4:8-disulfonic Acid  
and 2-Naphthylamine-7-sulfonic Acid

## 1:6-(or 1:7-)Diacetamido-anthraquinone



FORMATION.—The above intermediate is obtained by reduction and acetylation of the easily soluble dinitro-anthraquinone, prepared from the crude dinitration product of anthraquinone.

LITERATURE.—Ger. Pat. 72,685, 198,048  
Lange, Zwischenprodukte, #3218

## Dyes Derived from 1:6-(or 1:7-)Diacetamido-anthraquinone

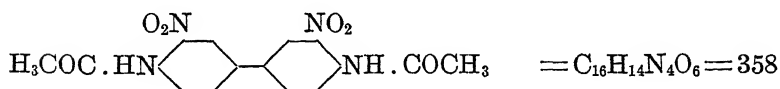
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
812	ANTHRAQUINONE AND ALLIED DYES Indanthrene Orange RT	I '14:— 2,103 I '20:— 382	2-Acetamido-anthraquinone	V
813	Indanthrene Copper R	I '14:— 1,268	1-Acetamido-anthraquinone	V



**Diacetyl-*o*:*o*'-dinitro-benzidine**

Diacetyl-3:3'-dinitro-benzidine (*numbering from point of attachment*)

2:2'-Dinitro-*p*:*p*'-biacetanilide (*C. A. nomen. with numbering from "chief function" or the acetamido groups*)



FORMATION.—Benzidine is acetylated by boiling with acetic acid under a reflux, and the resulting diacetyl-compound is nitrated by dissolving in 10 parts of nitric acid (sp. gr. 1.48) with cooling

LITERATURE.—Beil, IV, 964

Brunner and Witt, Ber. 20, 1024 (1887)

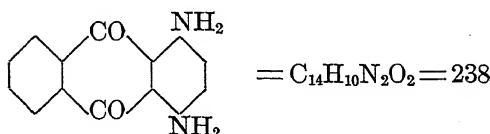
**Dye Derived from Diacetyl-*o*:*o*'-dinitro-benzidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
715	SULFUR DYE Thiocatechine		[Sulfur and Na <sub>2</sub> S]	S

***p*-(2:4-Diamino-anilino)-phenol** (*C. A. nomen.*)

*See*, 2:4-Diamino-4'-hydroxy-diphenylamine

**1:4-Diamino-anthraquinone**



FORMATION.—From 1-nitro-4-amino-anthraquinone (derived from 1-amino-anthraquinone) by reduction with alkaline sodium sulfide

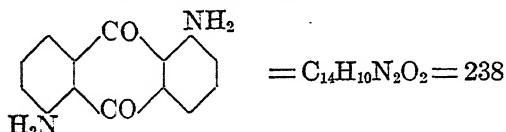
LITERATURE.—Lange, Zwischenprodukte, #3221, 3232, 3233

Ullmann, Enzy. tech. Chemie, 1, 477

## Dyes Derived from 1:4-Diamino-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
816	Algol Red 5G	I '14:— 1,338 I '20:— 51	Benzoyl chloride (2 mols)	V
873	Helindone Brown AN	I '14:— 2,831 I '20:— 16,290	1-Bromo-anthraquinone (2 mols)	V

## 1:5-Diamino-anthraquinone



FORMATION.—(1) From 1:5-dinitro-anthraquinone by reduction.  
 (2) From 1:5-anthraquinone-disulfonic acid by treatment with ammonia

LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 477  
 Lange, Zwischenprodukte, #3109, 3115, 3222, 3265

## Dyes Derived from 1:5-Diamino-anthraquinone

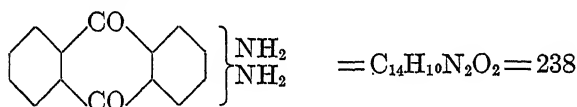
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
817	Algol Yellow R	I '14:— 4,887 I '20:— 2,299 M '20:— ?	Benzoyl chloride (2 mols)	V
819	Algol Red R	I '14:— 2,322 I '20:— 7,335	Benzoyl chloride (2 mols) [Oxidation]	V
828	Indanthrene Bordeaux B	I '20:— 2,741	2-Chloro-anthraquinone (2 mols)	V

**Dyes Derived from 1:5-Diamino-anthraquinone** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
845	Indanthrene Maroon R	I '20:— 46	1:5-Diamino-anthraquinone (2 mols)	V
848	Indanthrene Gray B	I '14:— 401 I '20:— 2,639	1:5-Diamino-anthraquinone (2 mols ?)	V

**Diamino-anthraquinones**

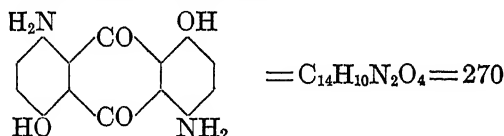
(Probably a mixture of the 1:4, 1:5 and 1:8)



**Dyes Derived from Diamino-anthraquinones**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
836	Helindone Brown 3GN	I '20:— 15,238	2-Anthraquinonyl-urea chloride (2 mols)	V

**4:8-Diamino-anthrarufin**



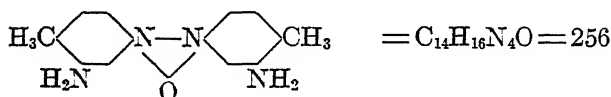
FORMATION.—1:5-Dinitro-anthraquinone is partly reduced, giving 1:5-dihydroxyamino-anthraquinone, which is then transformed into diamino-anthrarufin

LITERATURE.—Georgievics and Grandmougin, *Dye Chemistry*, 275

## Dyes Derived from 4:8-Diamino-anthrurufin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
820	ANTHRAQUINONE AND ALLIED DYES Algol Brilliant Violet R	I '14:— 12,784 I '20:— 7,856	Diamino-anthrurufin (2 mols) [Succinic Acid]	V
821	Algol Brilliant Violet 2B	I '14:— 3,893 I '20:— 827	Benzoyl chloride (2 mols)	V

## Diamino-azoxy-toluene

*p*-Azoxy-*o*-toluidine5:5'-Azoxy-bis-*o*-toluidine (*C. A. nomen.*)

FORMATION.—From 5-nitro-*o*-toluidine ( $\text{NH}_2=1$ ) by reduction, using zinc dust and caustic soda

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 99  
Lange, *Zwischenprodukte*, #1792

## Dyes Derived from Diamino-azoxy-toluene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
483	TRISAZO DYES St. Denis Red Rosophenine 4B	I '14:— 1,496 I '20:— 550	Neville-Winther's Acid (2 mols)	D
484	Milling Scarlet B,S		Neville-Winther's Acid R Acid	A

**4: 6-Diamino-*m*-benzene-disulfonic Acid** (*C. A. nomen.*)

*See, m*-Phenylene-diamine-disulfonic Acid

**2: 5-Diamino-benzene-sulfonic Acid** (*C. A. nomen.*)

*See, p*-Phenylene-diamine-sulfonic Acid

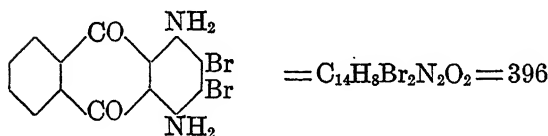
**6: 6'-Diamino-*m*: *m'*-bi(benzene-sulfonic) Acid** (*C. A. nomen.*)

*See, Benzidine-disulfonic Acid*

**2: 2'-Diamino-5: 5'-bi-*m*-toluene-sulfonic Acid** (*C. A. nomen.*)

*See, o*-Tolidine-disulfonic Acid

**1: 4-Diamino-2: 3-dibromo-anthraquinone**



FORMATION.—By brominating 1: 4-diamino-anthraquinone, probably in nitro-benzene solution. (The corresponding chloro-compound is made by action of sulfuryl chloride)

LITERATURE.—*Cf.* Lange, *Zwischenprodukte*, #3334

Barnett, *Anthracene and Anthraquinone*, 170-175, 190-231

**Dyes Derived from 1: 4-Diamino-2: 3-dibromo-anthraquinone**

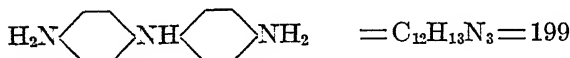
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
847	ANTHRAQUINONE AND ALLIED DYE Algol Green B	I '14:— 2,796 I '20:— 527	1: 4-Diamino-2: 3-dibromo-anthraquinone (2 mols)	V

**2: 7-Diamino-9-dioxide-?:?-dibenzothiophene-disulfonic Acid**  
(*C. A. nomen.*)

*See*, Benzidine-sulfon-disulfonic Acid

***p*: *p*'-Diamino-diphenylamine**

*p*: *p*'-Imino-bisaniline (*C. A. nomen.*)



STATISTICS.—Imported '14:—very small amount

FORMATION.—Equal molecules of aniline and *p*-phenylene-diamine are oxidized at 0° by means of potassium permanganate to a blue indamine, which is then reduced with zinc dust and hydrochloric acid

LITERATURE.—Nietzke, Ber., 16, 474

Lange, Zwischenprodukte, #1636, 1753

**Dye Derived from *p*: *p*'-Diamino-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
923	ANILINE BLACK GROUP Furreine DB	I '14:— 54,005 M '19:— ? I '20:— 1,600 M '20:—168,459	<i>p</i> : <i>p</i> '-Diamino-diphenylamine (x mols) (?) [Oxidation on hair]	Fur

**4: 4'-Diamino-diphenyl-3: 3'-disulfonic Acid**

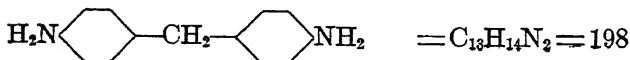
*See*, Benzidine-disulfonic Acid

***p*: *p*'-Diamino-diphenylethylene-*o*: *o*'-disulfonic Acid**

*See*, Diamino-stilbene-disulfonic Acid

***p*: *p*'-Diamino-diphenyl-methane**

*p*: *p*'-Methylene-bisaniline (*C. A. nomen.*)



STATISTICS.—Manufactured '20:— ?

FORMATION.—50 parts of anhydro-formaldehyde-aniline (from equal parts of aniline and 40 per cent formaldehyde), 100 parts of aniline and 70 parts of aniline salt are heated together on a water bath, condensing to the *p*:*p*'-diamino-diphenyl-methane

LITERATURE.—Schultz, Farbstofftabellen (1914), #511  
Lange, Zwischenprodukte, #1297

**Dyes Derived from *p*:*p*'-Diamino-diphenyl-methane**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
298	DISAZO DYE Milling Red R		R Acid (2 mols)	A
511	TRIPHENYL-METHANE DYES Parafuchsine Paramagenta	I '14 — 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline Nitro-benzene	B
540	Pacific Blue		Aniline <i>o</i> -Toluidine <i>p</i> -Toluidine [Sulfonation] or [ <i>p</i> -Rosaniline+Benzoic acid and sulfonation]	D

***p*:*p*'-Diamino-diphenyl-sulfide**

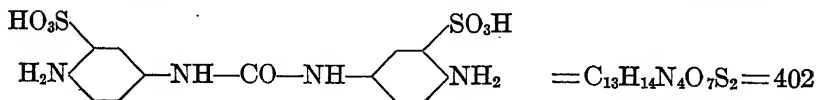
*See*, Thioaniline

**4:4'-Diamino-diphenyl-2:2'-sulfon-disulfonic Acid**

*See*, Benzidine-sulfon-disulfonic Acid

**Diamino-diphenyl-urea-disulfonic Acid**

5. 5'-Ureido-bis(2-amino-benzene-sulfonic Acid) (*C. A. nomen.*)



FORMATION.—24 Parts of 4-nitro-amino-benzene-3-sulfonic acid is dissolved in water containing 5.5 parts of soda ash, and phosgene conducted in until the reaction is completed, as indicated by test not diazotizing. The dinitro-body is now reduced with iron

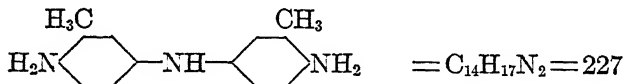
LITERATURE.—Lange, Zwischenprodukte, #1823.

**Dye Derived from Diamino-diphenyl-urea-disulfonic acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
297	DISAZO DYE Benzo Fast Pink 2BL	I '14:— 3,252 I '14:— 1,226	Gamma acid (2 mols)	D

***p*:*p*'-Diamino-ditolyl-amine**

4: 4'-Imino-bis-*o*-toluidine (*C. A. nomen. NH<sub>2</sub> = 1*)



FORMATION.—By semidine rearrangement of amino-azo-*o*-toluene whereby the hydrochloride of amino-azo-*o*-toluene is dissolved in sulfurous acid solution and reduced with zinc dust, the product poured into 50 per cent sulfuric acid, boiled and crystallized

LITERATURE.—Barber and Sisley, Sur un nouveau mode de formation de la *p*-diamino-diphenylamine  
Bull. Soc. Chim. [3] 33, 1232-34 (1905)  
Chem. Centr. 1906 [1], 232

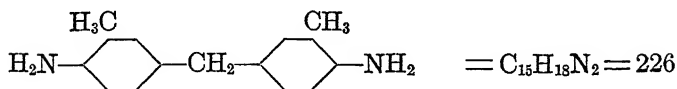
**Dye Derived from *p*:*p*'-Diamino-ditolyl-amine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
295	DISAZO DYE Diphenyl Fast Black	I '14:— 882	Gamma Acid <i>m</i> -Tolylene-diamine	D



*p*:*p*'-Diamino-ditolyl-methane

4: 4'-Methylene-bis-*o*-toluidine (*C. A. nomen.*)



FORMATION.—100 parts of anhydro-formaldehyde-aniline + 250 parts of *o*-toluidine hydrochloride + 500 parts of *o*-toluidine are warmed together on a water bath; and after 12 hours the mass is made alkaline and the aniline is distilled off with the aid of steam. (The anhydro-formaldehyde-aniline is only used as a carrier for the formaldehyde)

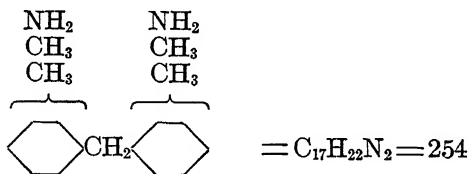
LITERATURE.—Lange, Zwischenprodukte, #1315, 1316

Dye Derived from *p*:*p*'-Diamino-ditolyl-methane

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
513	TRIPHENYL-METHANE			
	DYE			
	New Fuchsine O	I '14:— 300	<i>o</i> -Toluidine	B
		M '18:— ?	<i>o</i> -Nitro-toluene	
		M '19:— ?		
		M '20:— ?		

Diamino-dixylyl-methane

Methylene-bisxylylidine (*C. A. nomen*)

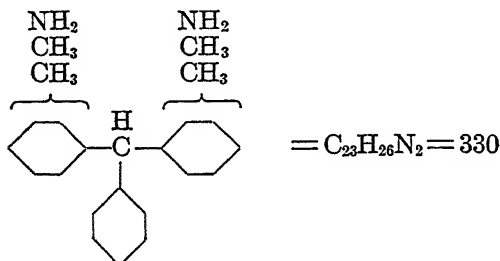


FORMATION.—From formaldehyde and xylylidine in the presence of a condensing agent

## Dye Derived from Diamino-dixylyl-methane

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
299	DISAZO DYE Cinnabar Scarlet BF		R Acid (2 mols)	CL

## Diamino-dixylyl-phenyl-methane

Benzal-bisxylylidine (*C. A. nomen.*)

FORMATION.—From benzaldehyde and xylylidine in the presence of a condensing agent

LITERATURE.—Lange, Zwischenprodukte, #1434

## Dye Derived from Diamino-dixylyl-phenyl-methane

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
300	DISAZO DYE Cotton Ponceau Cinnabar Scarlet G		R Acid (2 mols)	CL

Di-*p*-amino-ethoxy-diphenyl

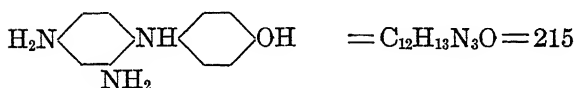
*See*, Ethoxy-benzidine

## 1:3-Diamino-2-hydroxy-benzene-5-sulfonic Acid

*See*, 2: 6-Diamino-1-phenol-4-sulfonic Acid

**2:4-Diamino-4'-hydroxy-diphenylamine**

*p*-(2:4-Diamino-anilino)-phenol (*C. A. nomen.*)



**FORMATION.**—Molecular proportions of 4-chloro-1:3-dinitro-benzene and *p*-amino-phenol are heated to boiling in aqueous suspension with somewhat more than theoretical amount of limestone. The heating is done by direct steam in a vessel provided with a reflux condenser. After all the chloro-nitro-benzene has disappeared, the liquid is cooled and the crystalline 2:4-dinitro-4'-hydroxy-diphenylamine is separated and washed. This is then reduced to the desired 2:4-diamino-4'-hydroxy-diphenylamine

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 74  
Lange, *Zwischenprodukte*, #1670

**Dye Derived from 2:4-Diamino-4'-hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
732	SULFUR DYE Autogene Black	I '14:— 7,495	Phenol [S <sub>2</sub> Cl <sub>2</sub> , S+Na <sub>2</sub> S]	S

**α-Diamino-naphthalene**

1:5-Diamino-naphthalene (*not considered herein*)

**β-Diamino-naphthalene**

1:8-Diamino-naphthalene (*not considered herein*)

**4:5-Diamino-2:7-naphthalene-disulfonic Acid** (*C. A. nomen.*)

*See*, 1:8-Naphthylene-diamine-3:6-disulfonic Acid

**4:8-Diamino-2:6-naphthalene-disulfonic Acid** (*C. A. nomen.*)

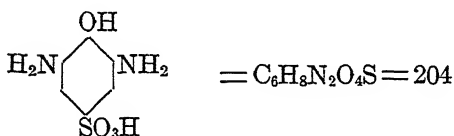
*See*, 1:5-Naphthylene-diamine-3:7-disulfonic Acid

**1:4-Diamino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)

*See*, 1:4-Naphthylene-diamine-2-sulfonic Acid

**2: 7-Diamino-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 2: 7-Naphthylene-diamine-sulfonic Acid**5: 7-Diamino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 1: 3-Naphthylene-diamine-6-sulfonic Acid**5: 8-Diamino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)*See*, 1: 4-Naphthylene-diamine-6-sulfonic Acid**2: 6-Diamino-1-phenol-4-sulfonic Acid** (*C. A. nomen. O H = 1*)

1: 3-Diamino-2-hydroxy-benzene-5-sulfonic Acid



**FORMATION.**—Phenol is sulfonated by dissolving in hot sulfuric acid, cooled, diluted, and then dinitrated, using nitric acid and heating to boiling. The dinitro-phenol-sulfonate is then isolated, dissolved in water, and reduced with ammonium sulfide, and the diamine precipitated by acidification

**LITERATURE.**—Lange, *Zwischenprodukte*, #1137

Cain, *Intermediate Products* (2d Ed.), 129, 130

**Dyes Derived from 2: 6-Diamino-1-phenol-4-sulfonic Acid**

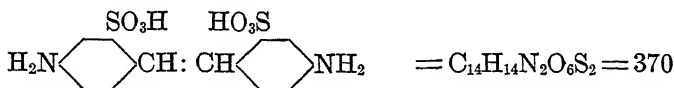
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
288	DISAZO DYES Acid Alizarin Black SE Palatine Chrome Black F	I '14:— 19,185 I '20:— 34,302	$\beta$ -Naphthol (2 mols)	ACr
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	$\beta$ -Naphthol Schaeffer's Acid	ACr

**Diamino-stilbene-disulfonic Acid**

*p*: *p*'-Diamino-diphenylethylene-*o*: *o*'-disulfonic Acid

DS (*abbreviation for above in compounds, less 2-NH<sub>2</sub>*)

4: 4'-Diamino-2: 2'-stilbene-disulfonic Acid (*C. A. nomen.*)



STATISTICS.—Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:—5,021 lbs.

Manufactured '20:—142,227 lbs.

FORMATION.—From sodium salt of *p*-nitro-toluene-*o*-sulfonate by dissolving in water and boiling with caustic soda until the color becomes deep red. Then reduction is effected by adding zinc dust until the liquid is decolorized

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 98

Lange, *Zwischenprodukte*, #1454

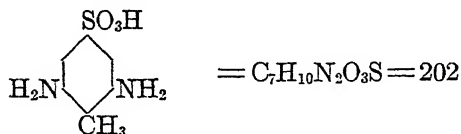
**Dyes Derived from Diamino-stilbene-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	DISAZO DYES			
301	Hessian Purple N	I '14:— 465	$\beta$ -Naphthylamine (2 mols)	D
302	Brilliant Hessian Purple		Broenner's Acid (2 mols)	D
303	Brilliant Yellow Paper Yellow	I '14:—278,000 M '17:— ? M '18:— 1,664 M '19:— 48,723 I '20:— 126 M '20:— 91,218	Phenol (2 mols)	D A
304	Chrysophenine G	I '14:—157,799 M '17:— ? M '18:— 41,663 M '19:— 86,795 I '20:— 3,661 M '20:—247,202	Phenol (2 mols) [Ethylation]	D
305	Hessian Yellow		Salicylic Acid (2 mols)	D

**3: 5-Diamino-*p*-toluene-sulfonic Acid** (*C. A. nomen.*  $SO_3H = 1$ )*p*-Tolylene-2: 6-diamine-4-sulfonic Acid

Toluylene-diamine-sulfonic Acid

1-Methyl-2: 6-diamino-benzene-4-sulfonic Acid



FORMATION.—From *o*-nitro-toluene by sulfonation, nitration and reduction

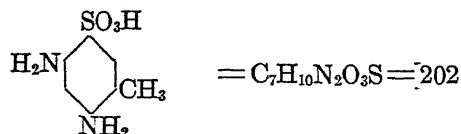
LITERATURE.—Lange, Zwischenprodukte, #1096

**Dyes Derived from 3: 5-Diamino-*p*-toluene-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
285	DISAZO DYES Toluylene Brown G		<i>m</i> -Phenylene-diamine	D
286	Toluylene Yellow	I '14:— 5,485	Nitro- <i>m</i> -phenylene-diamine (2 mols)	D
287	Toluylene Orange RR	I '14:— 500	$\beta$ -Naphthylamine (2 mols)	D
488	TETRAKISAZO DYE Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D

**4: 6-Diamino-*m*-toluene-sulfonic Acid** (*C. A. nomen.*  $SO_3H = 1$ )*m*-Tolylene-diamine-sulfonic Acid*m*-Toluylene-diamine-sulfonic Acid

1-Methyl-2: 4-diamino-benzene-5-sulfonic Acid



STATISTICS.—Manufactured in 1918, 1919, 1920, but in undisclosed quantities

FORMATION.—By addition of *m*-tolylene-diamine sulfate to oleum, and heating the mixture for three hours on a water bath.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87  
Lange, Zwischenprodukte, #1096

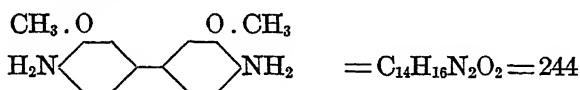
**Dyes Derived from 4: 6-Diamino-*m*-toluene-sulfonic Acid ( $SO_3H=1$ )**

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
362	DISAZO DYES Toluylene Orange R Oxydiamine Orange R	I '14:— 25,908 M '19:— ? I '20:— 1,653	Tolidine 4: 6-Diamino- <i>m</i> -toluene-sulfonic Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? M '20:— ? I '20:— 273	Tolidine <i>o</i> -Cresotic Acid	D

**Dianisidine**

*o*-Dianisidine

D (abbreviation for Dianisidine in compounds, without the 2-NH<sub>2</sub> groups)



STATISTICS.—Imported '14:—10,656 lbs.

Manufactured '17:—11,702 lbs.

Manufactured '18:— ?

Manufactured '19:—107,441 lbs.

Manufactured '20:— ?

FORMATION.—*o*-Nitro-anisole is reduced by zinc dust in presence of caustic soda and alcohol to hydrazo-anisole, which is rearranged to dianisidine by being warmed with dilute sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96  
Lange, Zwischenprodukte, #1204

## Dyes Derived from Dianisidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
405	DISAZO DYES Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? M '20:— 41,265 I '20:— 2,205	Naphthionic Acid (2 mols)	D
406	Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) $\beta$ -Naphthol (2 mols)	D
407	Azo Violet		Naphthionic Acid Nevile-Winther's Acid	D
408	Dianisidine Blue		$\beta$ -Naphthol (2 mols)	D
408(1)	Azophor Blue D		[Stable tetrazo-dianisole used with <i>p</i> -nitro-aniline]	MF
408(2)	Azophor Black S	I '14:— 140	[Stable tetrazo-dianisole mixed with diazo <i>m</i> -nitro-aniline, etc.]	MF
409	Trisulfon Blue B	I '14:— 813	1-Naphthol-3: 6: 8-trisulfonic Acid $\beta$ -Naphthol	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:— 150,589 I '20:— 287 M '20:— 237,328	Nevile-Winther's Acid (2 mols)	D
411	Benzoazurine 3G	I '20:— 201	1-Naphthol-5-sulfonic (2 mols)	D
412	Congo Blue 2B		R Acid Nevile-Winther's Acid	D
413	Direct Violet BB	I '14:— 4,396	1: 7-Dihydroxy-naphthalene-4-sulfonic Acid <i>m</i> -Tolylene-diamine	D



Dyes Derived from Dianisidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
414	Indazurine B		1: 7-Dihydroxy-naphthalene-4-sulfonic Acid R Acid	D
415	Dianil Blue G	M '19:— ? M '20:— ?	Chromotropic Acid (2 mols)	D
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
417	Chlorazol Blue 3G or R	I '14:— 10,151	1-Chloro-8-naphthol-5-sulfonic Acid (2 mols) or 1-Chloro-8-naphthol-4-sulfonic Acid (2 mols)	D
418	Diamine Brilliant Blue G	I '14:— 11,592 I '20:— 51	1-Chloro-8-naphthol-3: 6-disulfonic Acid (2 mols)	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	1-Amino-8-naphthol-2: 4-disulfonic Acid $\beta$ -Naphthol	D
420	Azidine Wool Blue B		Croceine Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	1-Amino-5-naphthol-7-sulfonic Acid Nevile-Winther's Acid	D
422	Chicago Blue 4B	I '14:— 8,269	1-Amino-8-naphthol-2: 4-disulfonic Acid 1-Amino-8-naphthol-4-sulfonic Acid	D

Dyes Derived from Dianisidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
423	Chicago Blue B	M '18:— ?	1-Amino-8-naphthol-4-sulfonic Acid (2 mols)	D
424	Chicago Blue 6B	I '14:—118,542 M '19:— ? I '20:— 7,480 M '20:— ?	1-Amino-8-naphthol-2:4-disulfonic Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	H Acid 1-Amino-8-naphthol-4-sulfonic Acid	D
426	Diamine Pure Blue Benzamine Pure Blue	I '14:— 12,881 M '17:— ? M '18:— ? M '19:—192,350 '20:— 652 M '20:—223,100	H Acid (2 mols)	D
427	Indazurine GM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid Nevile-Winther's Acid	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid Nevile-Winther's Acid	D
429	Indazurine BB		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid R Acid	D
430	Indazurine 5GM		1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid H Acid	D
	TRISAZO DYES			
455	Columbia Black B	I '14:—165,727	2 R Acid <i>m</i> -Tolylene-diamine (2 mols)	D

Dyes Derived from Dianisidine (*continued*)

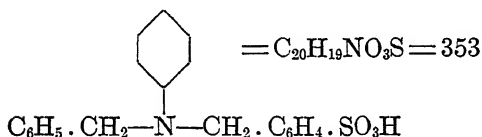
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRISAZO DYES ( <i>continued</i> )			
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1,821	$\alpha$ -Naphthylamine 1-Naphthol-3: 8-disulfonic Acid	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	2 R Acid Salicylic Acid <i>m</i> -Phenylene-diamine	D

Dibenzo-pyrrole

*See*, Carbazole

Dibenzyl-aniline-sulfonic (disulfonic) Acid

[(*N*-Benzyl-anilino)-methyl]-benzene-sulfonic Acid (*C. A. nomen.*)

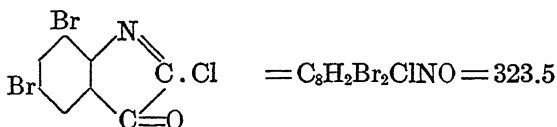


FORMATION.—Aniline, benzyl chloride and sodamide are mixed together and then heated up on water bath until ammonia is all off, resulting in the formation of dibenzyl-aniline. This latter is then sulfonated

LITERATURE.—Lange, Zwischenprodukte, #1561

Dye Derived from Dibenzyl-aniline-sulfonic (disulfonic) Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
531	TRIPHENYL-METHANE DYE Eriocyanine A	I '14:— 25,091 I '20:— 8,223	Tetramethyl- <i>p</i> : <i>p'</i> -diamino-benzohydrol-sulfonic Acid [Oxidation]	A

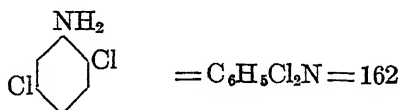
**5: 7-Dibromo-2-chloro-3-pseudoindolone** (*C. A. nomen.*)*See*, 5: 7-Dibromo-isatin Chloride**5: 7-Dibromo-isatin Chloride**5: 7-Dibromo-2-chloro-3-pseudoindolone (*C. A. nomen.*)

**FORMATION.**—Isatin is gently warmed with bromine in concentrated sulfuric acid, giving 5:7-dibromo-isatin, which is then warmed with phosphorus pentachloride and benzene

**LITERATURE.**—Ullmann, *Enzy. tech. Chemie*, 6, 526  
Lange, *Zwischenprodukte*, #2122

**Dyes Derived from 5: 7-Dibromo-isatin Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
893	INDIGO GROUP DYES Alizarin Indigo G	I '20:— 1,596	1-Anthrol	V
895	Alizarin Indigo 3R	I '20:— 3,514	$\alpha$ -Naphthol	V

**2: 5-Dichloro-aniline**

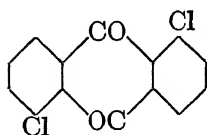
**FORMATION.**—From 2:5-dichloro-nitro-benzene by reduction with iron and hydrochloric acid

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 50

Dyes Derived from 2:5-Dichloro-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
218	DISAZO DYE Nigrophor BASF		1-Amino-8-naphthol-5- sulfonic Acid <i>p</i> -Nitro-aniline	MF
469	TRISAZO DYES Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine <i>m</i> -Phenylene-diamine H Acid	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine Phenol H Acid	D
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine Gamma Acid H Acid	D

1:5-Dichloro-anthraquinone



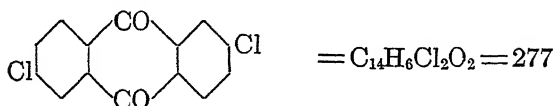
FORMATION.—Sodium 1:5-anthraquinone-disulfonate in dilute hydrochloric acid is heated to boiling and treated with a solution of sodium chlorate

LITERATURE.—Cain, Intermediate Products (2d Ed.), 250  
 Lange, Zwischenprodukte, #3083, 3086  
 Ullmann, Enzy. tech. Chemie, 1, 472

## Dye Derived from 1:5-Dichloro-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
832	ANTHRAQUINONE AND ALLIED DYES Indanthrene Violet RN	I '14:— 11,667 I '20:— 49	Anthranilic Acid (2 mols)	V

## 2:6-Dichloro-anthraquinone



FORMATION.—2:6-Anthraquinone-disulfonic acid is treated with chlorine

LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 472

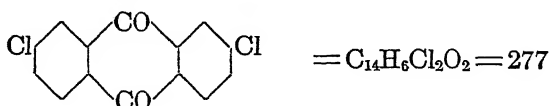
Cf. Ber., 37, 4706

Lange, Zwischenprodukte, #3164, 3165

## Dyes Derived from 2:6-Dichloro-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
826	ANTHRAQUINONE AND ALLIED DYES Indanthrene Red G		1-Amino-anthraquinone (2 mols)	V
829	Algol Bordeaux 3B	I '20:— 61	1-Amino-4-methoxy-anthraquinone (2 mols)	V

## 2:7-Dichloro-anthraquinone



FORMATION.—From anthraquinone-2:7-disulfonic acid by treatment with hydrochloric acid and sodium chlorate; or better from 9:10-dichloro-anthracene-2:7-disulfonic acid by treatment with the same reagents

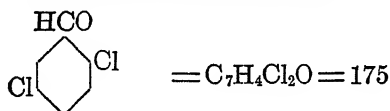
LITERATURE.—Ullmann, Enzy. tech. Chemie, 1, 472

Lange, Zwischenprodukte, #3165

**Dyes Derived from 2:7-Dichloro-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
827	Indanthrene Bordeaux B extra	I '14:— 28,728 I '20:— 4,056	1-Amino-6-chloro-anthraquinone (2 mols)	V
830	Indanthrene Red R	I '14:— 2,099 I '20:— 6,595	1-Amino-anthraquinone (2 mols)	V

**2:5-Dichloro-benzaldehyde**



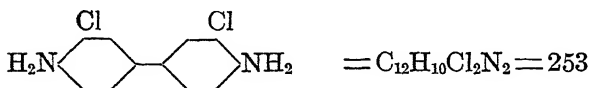
FORMATION.—From 2-chlor-5-nitro-benzaldehyde by the substitution of the nitro group by chlorine

LITERATURE.—Lange, Zwischenprodukte, #669

Beil, III, 13

**Dyes Derived from 2:5-Dichloro-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) [Oxidation]	B
501	Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl- <i>o</i> -toluidine (2 mols) [Oxidation]	B

***o*: *o*'-Dichloro-benzidine**2: 2'-Dichloro-benzidine (*C. A. nomen. NH<sub>2</sub>* = 1)3: 3'-Dichloro-benzidine (*Usual numbering, point of attachment* = 1)

**FORMATION.**—(1) By chlorinating of diacetyl-benzidine, and hydrolyzing product. (2) By reducing *o*-chloro-nitro-benzene in alkaline solution with zinc, and rearranging with acid the *o*:*o*'-dichloro-hydrazo-benzene formed (similar to benzidine formation from nitro-benzene)

**LITERATURE.**—Cain, *Intermediates* (2d Ed.), 94

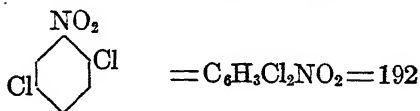
Lange, *Zwischenprodukte*, #1229, 1230

**Dyes Derived from *o*:*o*' Dichloro-benzidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
356	DISAZO DYES Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Naphthionic Acid (2 mols)	D
357	Dianol Red B		Broenner's Acid (2 mols)	D
358	Brilliant Dianol Red R extra Diphenyl Red	I '14:— 14,305 I '20:— 3,704	Amino-R Acid (2 mols)	D

**2: 5-Dichloro-4-(4: 5-dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic Acid** (*C. A. nomen.*)

See, 1-(2': 5'-Dichloro-4'-sulfo-phenyl)-3-methyl-5-pyrazolone

**2: 5-Dichloro-nitro-benzene**

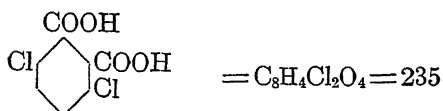


FORMATION.—By nitration of *p*-dichloro-benzene with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 14  
Lange, Zwischenprodukte, #674

USES.—For preparing 2: 5-dichloro-aniline

### 3: 6-Dichloro-phthalic Acid



STATISTICS.—Imported '14:—very small  
Manufactured '18:— ?

FORMATION.—(1) From dichloro-naphthalene tetrachloride, by oxidation with nitric acid. (2) From phthalic anhydride dissolved in oleum by chlorination in presence of iodine, and by separation from the isomers formed at the same time

LITERATURE.—Lange, Zwischenprodukte, #992  
Cain, Intermediate Products (2d Ed.), 165

### Dyes Derived from 3: 6-Dichloro-phthalic Acid

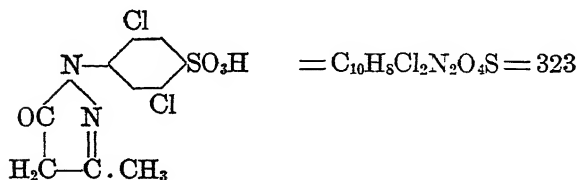
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
584	XANTHONE DYES Fast Acid Blue R	I '14:— 3,022 I '20:— 130	Resorcinol (2 mols) <i>p</i> -Phenetidine (2 mols) [PCl <sub>5</sub> ; Sulfonation] or [Tetrachloro-fluoresceine and <i>p</i> -phenetidine; Sulfonation]	A
593	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol (2 mols) [Bromination] or [Dichloro-fluoresceine brominated]	A

Dyes Derived from 3:6-Dichloro-phthalic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
594	XANTHONE DYES ( <i>continued</i> ) Cyanosine, Spirit Soluble		Resorcinol (2 mols) [Bromination, methyl- ation] or [Phloxine P methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	Resorcinol (2 mols) [Iodation] or [Dichloro-fluoresceine iodated]	A

## 1-(2:5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone

2:5-Dichloro-4-(4:5-dihydro-5-keto-3-methyl-1-pyrazolyl)-ben-  
zene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—2:5-Dichloro-aniline-4-sulfonic acid is diazotized and re-  
duced to 2:5-dichloro-phenyl-hydrazine-4-sulfonic acid, which latter  
body by condensation with ethyl acetoacetate forms the above  
pyrazolone derivative

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 170

*Cf.* Lange, *Zwischenprodukte*, #138

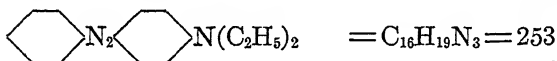
**Dye Derived from 1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
22	PYRAZOLONE DYE Xylene Yellow 3G	I '14:— 23,074 I '20:— 77,782	Sulfanilic Acid	A

***p*-Diethylamino-azo-benzene**

Benzene-azo-diethylaniline

*N*:*N*-Diethyl-*p*-phenylazo-aniline (*C. A. nomen.*)



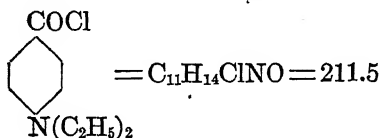
FORMATION.—By coupling diazo-benzene chloride (diazotized aniline) with diethyl-aniline

LITERATURE.—Ullmann, *Enzy. tech. Chemie*, 2, 80

**Dyes Derived from *p*-Diethylamino-azo-benzene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
641	OXAZINE DYES Coreine RR Cœlestine Blue B	I '14:— 1,320 I '20:— 44	Gallamide	M
646	Coreine AR		Gallamide Aniline [Sulfonation] or [Coreine RR, Aniline, Sulfonation]	M

***p*-Diethylamino-benzoyl Chloride**



FORMATION.—(1) *p*-Amino-benzoic acid is ethylated, and then treated with phosphorus pentachloride to form the desired acid chloride. (2) Diethyl-aniline is subjected to the action of phosgene first at ordinary temperatures until no more gas is absorbed, and then after melting the crystalline mass first obtained. The product is mixed with water and the excess of diethyl-aniline removed by acetic acid. The acid chloride is formed by treatment with phosphorus pentachloride

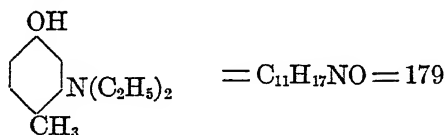
LITERATURE.—Cain, Intermediate Products (2d Ed.), 148

**Dye Derived from *p*-Diethylamino-benzoyl Chloride**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
534	TRIPHENYL-METHANE DYE Acid Violet 7B	I '14:— 21,665 I '20:— 51	<i>N</i> -Methyl-diphenyl-amine (2 mols)	A

**3-Diethylamino-*p*-cresol (C. A. nomen. OH = 1)**

Diethyl-*m*-amino-*p*-cresol (OH = 1)



FORMATION.—From diethyl-*o*-toluidine by sulfonation in the cold with oleum and caustic soda fusion of the sulfonic acid

LITERATURE.—Möhlau, Klimmer and Kahl, Zeit. Farb. Chem., 1902  
316

Lange, Zwischenprodukte, #815

**Dye Derived from 3-Diethylamino-*p*-cresol (OH = 1)**

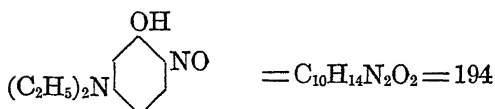
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
620	OXAZINE DYE Capri Blue GON	I' 14:— 128	Nitroso-dimethyl-aniline	B

**Diethyl-*m*-amino-*p*-cresol (OH=1)**

*See*, 3-Diethylamino-*p*-cresol (*C. A. nomen. OH* = 1)

**5-Diethylamino-2-nitroso-phenol (*C. A. nomen.*)**

Nitroso-diethyl-*m*-amino-phenol



FORMATION.—Diethyl-*m*-amino-phenol (which can be prepared by sulfonating diethyl-aniline and then fusing the sulfonic acid to produce the diethyl-*m*-amino-phenol) is dissolved in hydrochloric acid, cooled with ice to 0° C., and sodium nitrite solution introduced

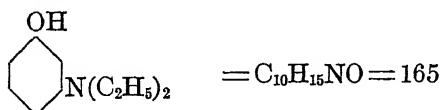
LITERATURE.—Lange, *Zwischenprodukte*, #906

**Dyes Derived from 5-Diethylamino-2-nitroso-phenol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
653	OXAZINE DYES Nile Blue A	I '14:— 1,518 I '20:— 1,241	<i>α</i> -Naphthylamine	B
654	Nile Blue 2B		Benzyl- <i>α</i> -naphthylamine	B

***m*-Diethylamino-phenol (*C. A. nomen.*)**

Diethyl-*m*-amino-phenol



STATISTICS.—Manufactured '18:— ?  
 Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—Diethyl-aniline is sulfonated with oleum, and the resulting diethyl-aniline-*m*-sulfonic acid fused with caustic soda

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 122  
 Lange, *Zwischenprodukte*, #603–606, 2263

Dyes Derived from *m*-Diethylamino-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
XANTHONE DYES				
570	Rhodamine S	I '14:— 600 I '20:— 273	Diethyl- <i>m</i> -amino- phenol (2 mols) [Succinic Anhydride]	A
572	Rhodamine G	I '14:— 2,648 I '20:— 517	Phthalic Anhydride Diethyl- <i>m</i> -amino- phenol (2 mols) Aniline [Removes one C <sub>2</sub> H <sub>5</sub> group] or [Rhodamine B heated with Aniline Salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? M '20:— ? I '20:— 24,709	Phthalic Anhydride Diethyl- <i>m</i> -amino- phenol (2 mols)	B
574	Rhodamine 3B		Phthalic Anhydride Diethyl- <i>m</i> -amino- phenol (2 mols) [Ethyl esterification] or [Rhodamine B ethylated]	B
579	Sulfo Rhodamine B Xylene Red B	I '14:— 1,698	Benzaldehyde-di- sulfonic Acid Diethyl- <i>m</i> -amino- phenol (2 mols) [Oxidation]	A
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Phthalic Anhydride Diethyl- <i>m</i> -amino- phenol (2 mols) or [Rhodamine B, sulfo- nated]	A

**Diethyl-aniline**

*N*: *N*-Diethyl-aniline (*C. A. nomen.*)



STATISTICS.—Imported '14:—very small quantity

Manufactured '17:— 3,955 lbs.

Manufactured '18:—48,048 lbs.

Manufactured '19:—30,000 lbs.

Manufactured '20:—180,542 lbs.

FORMATION.—Aniline is heated in an autoclave with ethyl alcohol in the presence of a catalyst, for example, hydrochloric acid, hydrobromic acid, or iodine

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 68

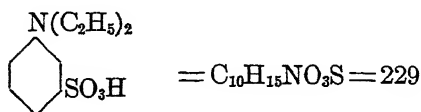
Lange, *Zwischenprodukte*, #128

**Dyes Derived from Diethyl-aniline**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
499	Brilliant Green	I '14:— 73,904 M '18:— ? M '19:— ? I '20:— 25 M '20:— ?	Diethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
507	Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) 3-Methyl-benzaldehyde-4:6-disulfonic Acid [Oxidation]	A
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Tetraethyl-diamino-benzophenone or Diethyl-aniline (3 mols) Phosgene or Tetraethyl-diamino-diphenyl-methane	B

Dyes Derived from Diethyl-aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Ethyl-sulfobenzyl- aniline (2 mols) [Formaldehyde, Oxida- tion]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) <i>m</i> -Nitro-benzaldehyde or <i>m</i> -Hydroxy- benzaldehyde [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) <i>m</i> -Nitro-benzaldehyde or <i>m</i> -Hydroxy- benzaldehyde [Sulfonation, Oxidation] or [Patent Blue Oxidized]	A
686	AZINE DYE Amethyst Violet		Diethyl- <i>p</i> -phenylene- diamine Aniline or <i>p</i> -Toluidine [Oxidation]	A

Diethyl-aniline-*m*-sulfonic Acid*N*: *N*-Diethyl-metanilic Acid (*C. A. nomen.*)

FORMATION.—From diethyl-aniline by sulfonation with oleum

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 122Lange, *Zwischenprodukte*, #631



Dyes Derived from Diethyl-aniline-*m*-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
59	MONOAZO DYE Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	2: 4-Dinitro-aniline	A

*N*: *N*-Diethyl-metanilic Acid (*C. A. nomen.*)

See, Diethyl-aniline-*m*-sulfonic Acid

*N*: *N*-Diethyl-*p*-nitroso-aniline (*C. A. nomen.*)

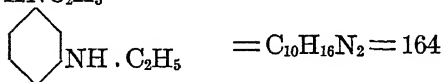
See, *p*-Nitroso-diethyl-aniline

*N*: *N*-Diethyl-*p*-phenylazo-aniline (*C. A. nomen.*)

See, *p*-Diethylamino-azo-benzene

*N*: *N'*-Diethyl-*m*-phenylene-diamine (*C. A. nomen.*)

*s*-Diethyl-*m*-phenylene-diamine



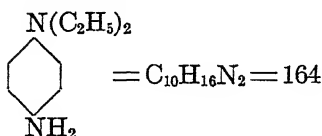
FORMATION.—Probably by heating resorcinol with ethylamine in the presence of a dehydrating agent

LITERATURE.—*Cf.* Green, Organic Coloring Matters (1908), 37.

*Cf.* Calm, Ber., 16, 2792 (1883)

Dye Derived from *N*: *N'*-Diethyl-*m*-phenylene-diamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
678	AZINE DYE Fast Neutral Violet B	M '17:— ?	Nitroso-dimethyl-aniline	B

***N*: *N*-Diethyl-*p*-phenylene-diamine** (*C. A. nomen.*)*p*-Amino-diethyl-aniline

FORMATION.—Diethyl-aniline is converted into *p*-nitroso-diethyl-aniline by nitrous acid, which by reduction with zinc dust and hydrochloric acid yields the *p*-amino-diethyl-aniline

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #561–563

**Dye Derived from *N*: *N*-Diethyl-*p*-phenylene-diamine**

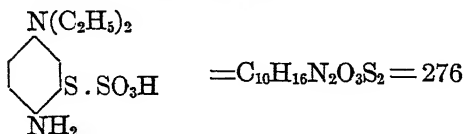
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
686	AZINE DYE Amethyst Violet		Diethyl-aniline Aniline or <i>p</i> -Toluidine [Oxidation]	A

***s*-Diethyl-*m*-phenylene-diamine**

*See, N*: *N'*-Diethyl-*m*-phenylene-diamine

**Diethyl-*p*-phenylene-diamine-thiosulfonic Acid***p*-Amino-diethyl-aniline-thiosulfonic Acid

4-Amino-1-diethylamino-benzene-3-thiosulfonic Acid

2-Amino-5-diethylamino-benzene-thiosulfonic Acid (*C. A. nomen.*)

FORMATION.—12 parts of the zinc chloride double salt of diethyl-*p*-phenylene-diamine are dissolved in 90 parts of water, treated with a solution of 25 parts of aluminum sulfate and 20 parts of sodium thiosulfate in 70 parts of water, and finally oxidized with 3 parts of potassium bichromate dissolved in 30 parts of water

LITERATURE.—Lange, Zwischenprodukte, #931, 932

**Dye Derived from Diethyl-*p*-phenylene-diamine-thiosulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
666	THIAZINE DYE Indochromogen S		1: 2-Naphthoquinone- 4: 6-disulfonic Acid	M

**3: 4-Dihydro-3: 4-diketo-1: 7-naphthalene-disulfonic Acid** (*C. A. nomen.*)

*See*, 1: 2-Naphthoquinone-4: 6-disulfonic Acid

**3: 4-Dihydro-3: 4-diketo-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)

*See*, 1: 2-Naphthoquinone-4-sulfonic Acid

***p*-(4: 5-Dihydro-5-keto-3-methyl-1-pyrozolyl)-benzene-sulfonic Acid** (*C. A. nomen.*)

*See*, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

**1: 2-Dihydroxy-anthraquinone**

*See*, Alizarin

**1: 5-Dihydroxy-anthraquinone**

*See*, Anthrarufin

**2: 4-Dihydroxy-benzoic Acid**

*See*,  $\beta$ -Resorcylic Acid (*C. A. nomen.*)

**3: 5-Dihydroxy-benzoic Acid**

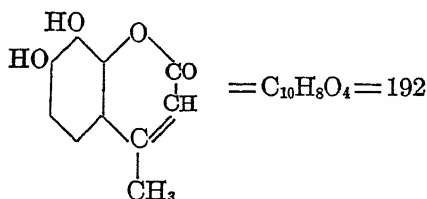
*See*,  $\alpha$ -Resorcylic Acid (*C. A. nomen.*)

***m*-Dihydroxy-benzoic Acid**

*See*,  $\alpha$ -Resorcylic Acid (*C. A. nomen.*)

**1: 7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid**

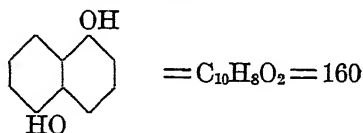
*See*, 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid

**1: 7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid***See, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid***Dihydroxy- $\beta$ -methyl-coumarin***See, 7: 8-Dihydroxy-4-methyl-coumarin (C. A. nomen.)***7: 8-Dihydroxy-4-methyl-coumarin (C. A. nomen.)****Dihydroxy- $\beta$ -methyl-coumarin****FORMATION.**—From pyrogallol and acetoacetic ethyl ester**LITERATURE.**—J. pr. Ch. (2) 26, 68

Ber., 16, 2127 (1883)

**Dye Derived from 7: 8-Dihydroxy-4-methyl-coumarin**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
773	ANTHRAQUINONE AND ALLIED DYE Anthracene Yellow	I '14:— 4,046	[Bromination]	M

**1: 5-Dihydroxy-naphthalene***1: 5-Naphthalenediol (C. A. nomen.)***STATISTICS.**—Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—By caustic soda fusion of sodium naphthalene-1:5-disulfonate or of sodium 1-naphthol-5-sulfonate

LITERATURE.—Cain, Intermediate Products (2d Ed.), 230

Lange, Zwischenprodukte, #2392

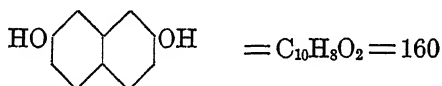
Thorpe, Dic. Chemistry, 3, 646

**Dye Derived from 1:5-Dihydroxy-naphthalene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
157	MONOAZO DYE Diamond Black PV	I '14:—285,074	<i>o</i> -Amino-phenol- <i>p</i> -sulfonic Acid	M

**2:7-Dihydroxy-naphthalene**

2:7-Naphthalenediol (*C. A. nomen.*)



FORMATION.—By caustic soda fusion of F acid (2-naphthol-7-sulfonic acid)

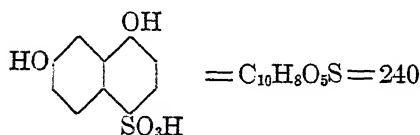
LITERATURE.—Lange, Zwischenprodukte, #2401

Green, Organic Coloring Matters (1908), 54

Thorpe, Dic. Chemistry, 3, 647

**Dyes Derived from 2:7-Dihydroxy-naphthalene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
3	NITROSO DYE Dioxine		[Nitrous Acid]	M
655	OXAZINE DYE Muscarine		Nitroso-dimethyl-aniline	B

**1: 7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid***See*, 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid**1: 7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid***See*, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid**1: 8-Dihydroxy-naphthalene-3: 6-disulfonic Acid***See*, Chromotropic Acid**4: 5-Dihydroxy-2: 7-naphthalene-disulfonic Acid** (*C. A. nomen.*)*See*, Chromotropic Acid**1: 7-Dihydroxy-naphthalene-4-sulfonic Acid****4: 6-Dihydroxy-1-naphthalene-sulfonic Acid** (*C. A. nomen.*)

**FORMATION.**—From 1 hydroxy-naphthalene-2-carboxylic-4: 7-disulfonic acid by fusion with alkalis, whereby first a sulfonic group is replaced by hydroxyl and then at a higher temperature carbon dioxide is split out

**LITERATURE.**—Lange, *Zwischenprodukte*, #2617, 2618  
 Thorpe, *Dic. Chemistry*, 3, 650

**Dyes Derived from 1: 7-Dihydroxy-naphthalene-4-sulfonic Acid**

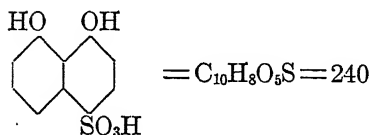
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
413	DISAZO <sup>®</sup> DYES Direct Violet BB	I '14:— 4,396	Dianisidine <i>m</i> -Tolylene-diamine	D
414	Indazurine B		Dianisidine R Acid	D

1:8-Dihydroxy-naphthalene-4-sulfonic Acid

Dihydroxy-naphthalene-sulfonic Acid S

S Acid

4:5-Dihydroxy-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



STATISTICS.—Imports '14:—2,178 lbs.

FORMATION.—(1) From 1-naphthol-4:8-disulfonic acid by fusion with caustic soda, preferably in an autoclave. (2) From 1-naphthylamine-4:8-disulfonic acid by fusion with caustic soda, in an autoclave. (3) From 1-amino-8-naphthol-4-sulfonic acid by heating with sodium sulfite

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 230

Lange, *Zwischenprodukte*, #2621, 2622

**Dyes Derived from 1:8-Dihydroxy-naphthalene-4-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
63	MONOAZO DYES Azo Acid Blue	I '14:— 45,098 I '20:— 9,222	Dimethyl- <i>p</i> -phenylene-diamine or <i>p</i> -Nitro-aniline [Reduction and alkylation]	A
71	Azo Fuchsine B		Toluidine	A
118	Brilliant Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio- <i>p</i> -toluidine	D
146	Azo Fuchsine G	I '14:— 17,819 I '20:— 3,694	Sulfanilic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	Sulfanilic Acid (?)	A

**Dyes Derived from 1:8-Dihydroxy-naphthalene-4-sulfonic Acid**  
(continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	<b>DISAZO DYES</b>			
229	Azo Acid Violet	I '14:— 150 I '20:— 11 M '20:— ?	Amino-azo-benzene	A
242	Sulfon Black G		Aniline 1-Naphthylamine-6- and 7-sulfonic Acids [Cleve's Acids]	A
262	Victoria Black B	I '14:— 557	Sulfanilic Acid $\alpha$ -Naphthylamine	A
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic $\alpha$ -Naphthylamine	ACr
416	Brilliant Azurine 5G	I '14:— 22,324 I '20:— 1,563	Dianisidine 1:8-Dihydroxy-naph- thalene-4-sulfonic Acid (2 mols)	D
	<b>TRISAZO DYES</b>			
452	Benzo Indigo Blue		Tolidine $\alpha$ -Naphthylamine 1:8-Dihydroxy-naph- thalene-4-sulfonic Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic- Acid $\alpha$ -Naphthylamine 1:8-Dihydroxy-naph- thalene-4-sulfonic Acid (2 mols)	D

**4:5-Dihydroxy-1-naphthalene-sulfonic Acid (C. A. nomen.)**

See, 1:8-Dihydroxy-naphthalene-4-sulfonic Acid

**4:6-Dihydroxy-1-naphthalene-sulfonic Acid (C. A. nomen.)**

See, 1:7-Dihydroxy-naphthalene-4-sulfonic Acid



**Dihydroxy-naphthalene-sulfonic Acid S**

*See, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid*

**Dihydroxy-naphthoic Acid L**

2: 6-Dihydroxy-3-naphthoic Acid (*not considered herein*)

**Dihydroxy-naphthoic Acid S**

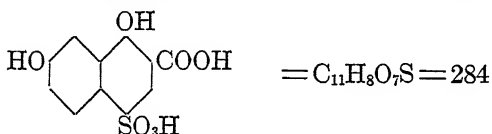
1: 7-Dihydroxy-6-naphthoic Acid (*not considered herein*)

**1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid**

1: 7-Dihydroxy-naphthalene-2-carboxylic-4-sulfonic Acid

1: 7-Dihydroxy-2-carboxy-naphthalene-4-sulfonic Acid

1: 7-Dihydroxy-4-sulfo-2-naphthoic Acid (*C. A. nomen.*)



FORMATION.—1-Hydroxy-2-naphthoic acid is disulfonated with 4 parts of 20 per cent oleum, the product isolated and fused with caustic soda at 190–200°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 242

Lange, *Zwischenprodukte*, 2677

**Dyes Derived from 1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
396	DISAZO DYES Indazurine RM		Tolidine Nevile-Winther's Acid	D
399	Indazurine TS		Tolidine Gamma Acid	D
427	Indazurine GM		Dianisidine Nevile-Winther's Acid	D
429	Indazurine BB		Dianisidine R Acid	D
430	Indazurine 5GM		Dianisidine H Acid	D

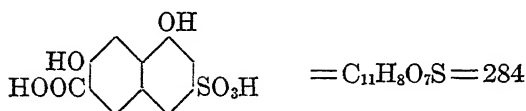
**1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid**

1: 7-Dihydroxy-naphthalene-6-carboxylic-3-sulfonic Acid

1: 7-Dihydroxy-6-carboxy-naphthalene-3-sulfonic Acid

Nigrotic Acid

Nigroinic Acid

3: 5-Dihydroxy-7-sulfo-2-naphthoic Acid (*C. A. nomen.*)

FORMATION.—2-Hydroxy-3-naphthoic acid is disulfonated with 4 parts of 24 per cent oleum at 125–150° for from two to three hours, the product isolated, and fused with 2 parts of caustic soda at about 210–220° and then at 230–240°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 241  
Lange, *Zwischenprodukte*, #2678

**Dyes Derived from 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
352	DISAZO DYES Direct Violet R	I '14:— 661 M '19:— ?	Benzidine <i>m</i> -Tolylene-diamine	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine H Acid	D
354	Direct Gray R	I '20:— 4,927	Benzidine 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid (2 mols)	D
397	Direct Blue R	M '17:— ?	Tolidine Nevile-Winther's Acid	D

**Dyes Derived from 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid**  
(continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
398	DISAZO DYES (continued) Direct Gray B		Tolidine 1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid (2 mols)	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine Neville-Winther's Acid	D

**1:2-Dihydroxy-naphthoquinone**

*See, Naphthazarin*

**5:6-Dihydroxy-1:4-naphthoquinone**

*See, Naphthazarin*

**5:6-Dihydroxy- $\alpha$ -naphthoquinone**

*See, Naphthazarin*

**1:7-Dihydroxy-4-sulfo-2-naphthoic Acid (C. A. nomen.)**

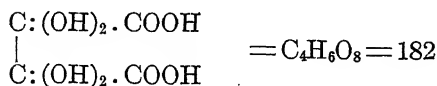
*See, 1:7-Dihydroxy-2-naphthoic-4-sulfonic Acid*

**3:5-Dihydroxy-7-sulfo-2-naphthoic Acid (C. A. nomen.)**

*See, 1:7-Dihydroxy-6-naphthoic-3-sulfonic Acid*

**Dihydroxy-tartaric Acid**

Dioxy-tartaric Acid



FORMATION.—By oxidation of tartaric acid with strong nitric acid in presence of oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 168

### Dyes Derived from Dihydroxy-tartaric Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
23	PYRAZOLONE DYE Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine- <i>p</i> -sulfonic Acid (2 mols)	A

**3:6-Dihydroxy-9-xanthene-propionic Acid,  $\gamma$ -Lactone** (*C. A. nomen.*)

*See*, Resorcinol-succinein

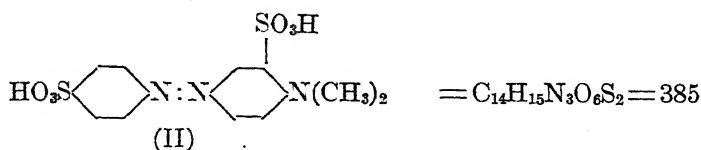
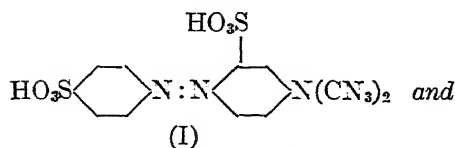
***p*-(*p*-Dimethylamino-anilino)-*p*-phenol** (*C. A. nomen.*)

*See*, 4-Dimethylamino-4'-hydroxy-diphenylamine

### Dimethylamino-azo-benzene-disulfonic Acids

5-Dimethylamino-*o*: *p*'-azo-bis(benzene-sulfonic Acid) (*C. A. nomen. for I*)

6-Dimethylamino-*m*: *p*'-azo-bis(benzene-sulfonic Acid) (*C. A. nomen. for II*)



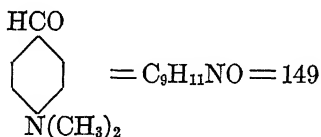
FORMATION.—The compound represented by "Formula I" is prepared by coupling diazotized sulfanilic acid with dimethyl-aniline-*m*-sulfonic acid (prepared by sulfonating dimethyl-aniline). The isomeric compound represented in all probability by "Formula II," is made by direct sulfonation of dimethylamino-azo-benzene by means of oleum

LITERATURE.—Ger. Pat. 80434, Methods (b) and (a). Frdl. 4, 490  
Cf. Ullmann, Enzy. tech. Chemie, 2, 81

**Dye Derived from Dimethylamino-azo-benzene-disulfonic Acids**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
628	OXAZINE DYE Gallocyanine MS	I '20:— 22	Gallic Acid	M

***p*-Dimethylamino-benzaldehyde**

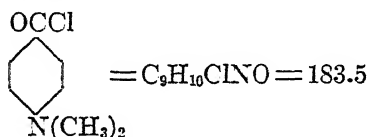


FORMATION.—Dimethyl-aniline is changed into dimethylamino-benzyl alcohol by treatment with hydrochloric acid and formaldehyde. This is then oxidized by adding nitroso-dimethyl-aniline directly to the crude alcohol, resulting in the formation of dimethylamino-benzylidene-amino-dimethyl-aniline,  $(\text{CH}_3)_2\text{N} \cdot \text{C}_6\text{H}_4 \cdot \text{CH} : \text{N} \cdot \text{C}_6\text{H}_4 \cdot \text{N}(\text{CH}_3)_2$ . This latter by treatment with nitrous acid or formaldehyde forms pure *p*-dimethylamino-benzaldehyde

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 307  
Lange, Zwischenprodukte, #333-335

Dyes Derived from *p*-Dimethylamino-benzaldehyde

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
529	TRIPHENYL-METHANE DYE Acid Violet 6B		Ethyl-sulfobenzyl-aniline (2 mols) [Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Dimethyl-aniline <i>m</i> -Xylene	A

*p*-Dimethylamino-benzoyl Chloride

FORMATION.—From dimethyl-aniline by action of phosgene

LITERATURE.—Beil., 2, 1271

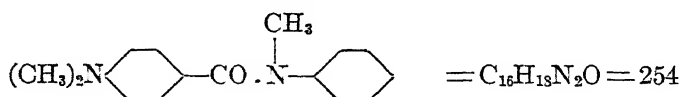
Dye Derived from *p*-Dimethylamino-benzoyl Chloride

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
533	TRIPHENYL-METHANE DYE Acid Violet 7BN		Methyl-diphenylamine-sulfonic Acid (2 mols)	A

## Dimethylamino-benzoyl-methyl-aniline

Dimethylamino-benzo-methyl-aniline (*Schultz nomen.*)

*p*-Dimethylamino-*N*-methyl-benzanilide (*C. A. nomen.*)



FORMATION.—Dimethyl-aniline reacting with phosgene forms *p*-dimethylamino-benzoyl chloride, which latter unites with methyl-aniline to form the *p*-dimethylamino-benzoyl-methyl-aniline

LITERATURE.—*Cf.* Ger. Pat. 41751, 44077

*Cf.* Georgievics and Grandmougin, Dye Chemistry, 174

**Dye Derived from Dimethylamino-benzoyl-methyl-aniline**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
493	DIPHENYL-METHANE DYE Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 M '20:— ? I '20:— 74,414	Dimethyl-aniline	B

**6-(*p*-Dimethylamino-benzyl)-*N*:*N*-dimethyl-metanilic Acid** (*C. A. nomen.*)

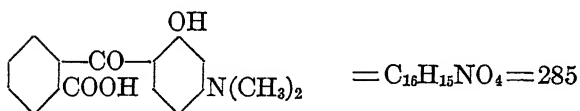
*See, p*: *p'*-Tetramethyl-diamino-diphenylmethane-sulfonic Acid

**5-Dimethylamino- $\alpha$ -(*p*-dimethylamino-phenyl)- $\alpha$ -hydroxy-*o*-toluene-sulfonic Acid** (*C. A. nomen.*)

*See, p*: *p'*-Tetramethyl-diamino-benzohydrol-sulfonic Acid

**(Dimethylamino-hydroxy-benzoyl)-benzoic Acid**

*o*-(4-Dimethylamino-2-hydroxy-benzoyl)-benzoic Acid (*C. A. nomen.*)



FORMATION.—By condensing phthalic anhydride and *m*-dimethylamino-phenol

LITERATURE.—Georgievics and Grandmougin, *Dye Chemistry*, 232

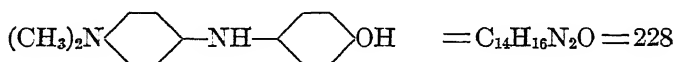
Lange, *Zwischenprodukte*, #1394, 1395 (*Note Lange's formula is at variance with structure given above, which, however, corresponds to the generally accepted formula*)

### Dyes Derived from (Dimethylamino-hydroxy-benzoyl)benzoic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
575	XANTHONE DYES Rhodine 12GM		Resorcinol Methyl Ether [Ethyl esterification]	B
576	Rhodamine 3G	I '14:— 19,568 I '20:— 855	3-Amino- <i>p</i> -cresol [Ethyl esterification]	B
577	Rhodine 2G		Ethyl- <i>m</i> -amino-phenol [Ethyl esterification]	B
578	Rhodamine 12GF		Resorcinol [Formaldehyde; esterification]	B

### 4-Dimethylamino-4'-hydroxy-diphenylamine

*p*-(*p*-Dimethylamino-anilino)-phenol (*C. A. nomen.*)



FORMATION.—(1) Dimethyl-*p*-phenylene-diamine is heated with the hydrochloride of *p*-amino-phenol. (2) Dimethyl-*p*-phenylene-diamine and phenol are simultaneously oxidized and the product carefully reduced

LITERATURE.—Lange, *Zwischenprodukte*, #1644

Lange, *Swefelfarbstoffe*, 145, 157

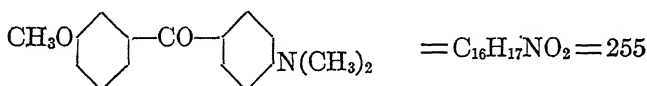


**Dye Derived from 4-Dimethylamino-4'-hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
728	SULFUR DYE Immedial Sky Blue	M '17:— ?	[S+Na <sub>2</sub> S]	S

**4-Dimethylamino-3'-methoxy-benzophenone (C. A. nomen.)**

Methoxy-dimethylamino-benzophenone



FORMATION.—10 parts of *m*-methoxy-benzanilide, 14 parts of dimethylaniline and 7 parts of phosphorus oxychloride are heated together carefully on the water bath at 90°. The melt is treated with 50 parts of water and 5 parts of hydrochloric acid, and the yellow brown solution warmed to 70–80° until the color has disappeared, which indicates the completion of the splitting off of the aniline. More water is now added, the precipitate filtered, washed, dried, and crystallized from two parts of alcohol. From the filtrate aniline and dimethyl-aniline can be recovered

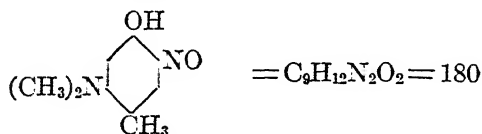
LITERATURE.—Lange, *Zwischenprodukte*, #1383

**Dye Derived from 4-Dimethylamino-3'-methoxy-benzophenone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
547	TRIPHENYL-METHANE DYE Ketone Blue 4BN		Methyl-diphenylamine [Sulfonation]	A

***p*-Dimethylamino-*N*-methyl-benzanilide (C. A. nomen.)**

*See*, Dimethylamino-benzoyl-methyl-aniline

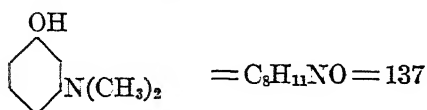
**2-Dimethylamino-8-naphthol-6-sulfonic Acid***See, Dimethyl-gamma Acid***7-Dimethylamino-1-naphthol-3-sulfonic Acid (C. A. nomen.)***See, Dimethyl-gamma Acid***5-Dimethylamino-2-nitroso-*p*-cresol (OH=1, C. A. nomen.)**Nitroso-dimethyl-*m*-amino-*p*-cresol (OH=1)

FORMATION.—3-Dimethylamino-*p*-cresol (OH=1) [which can be obtained by decomposing diazo-dimethyl-*o*-toluidine in an acid solution] is dissolved in hydrochloric acid, cooled to 0° C., and nitrosified with aqueous solution of sodium nitrite

LITERATURE.—Lange, Zwischenprodukte, #1089

**Dye Derived from 5-Dimethylamino-2-nitroso-*p*-cresol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
621	OXAZINE DYE Cresyl Blue 2BS		<i>p</i> -Phenylene-diamine	B

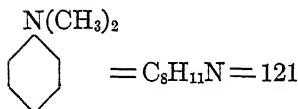
***m*-Dimethylamino-phenol (C. A. nomen.)***m*-Hydroxy-dimethyl-anilineDimethyl-*m*-amino-phenol

FORMATION.—By caustic soda fusion of dimethyl-aniline-*m*-sulfonic acid, prepared by sulfonating dimethyl-aniline with oleum

LITERATURE.—Lange, Zwischenprodukte, #603-606, 2263

Dyes Derived from *m*-Dimethylamino-phenol

<i>Schult. Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
568	XANTHONE DYES Pyronine G		<i>m</i> -Dimethylamino- phenol (2 mols) [Oxidation]	B
569	Acridine Red B		<i>m</i> -Dimethylamino- phenol (2 mols) [Oxidation] or [Oxidation of Pyronine G with KMnO <sub>4</sub> ]	B
570	Rhodamine S	I '14:— 600 I '20:— 273	<i>m</i> -Dimethylamino- phenol (2 mols) [Succinic Anhydride]	A

**Dimethyl-aniline***N*:*N*-Dimethyl-aniline (*C. A. nomen.*)

STATISTICS.—Imported '14:— 48,642 lbs.  
 Manufactured '17:—2,847,093 lbs.  
 Manufactured '18:—4,263,458 lbs.  
 Manufactured '19:—3,559,654 lbs.  
 Manufactured '20:—5,447,107 lbs.

FORMATION.—By heating aniline and methanol (methyl alcohol) in an autoclave in the presence of sulfuric acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 62  
 Lange, *Zwischenprodukte*, #129

## Dyes Derived from Dimethyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
<b>MONOAZO DYES</b>				
32	Butter Yellow Oil Yellow	I '14:— 4,062 M '17:— 33,180 M '18:— 27,669 M '19:— 31,156 M '20:— 74,182	Aniline	SS
124	Diazine Green S	I '14:— 1,340	<i>p</i> -Tolylene-diamine <i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine or Safranine	B
138	Helianthine Methyl Orange	I '14:— 500 M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid	A
<b>AURAMINES</b>				
493	Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	Dimethylamino-benzo- methylaniline	B
<b>TRIPHENYL-METHANE DYES</b>				
495	Malachite Green	I '14:—183,852 M '17:—130,229 M '18:—290,416 M '19:—560,301 I '20:— 100 M '20:—654,237	Dimethyl-aniline (2 mols) Benzaldehyde [Oxidation]	B
496	Setoglaurine O	I '20:— 1,102	Dimethyl-aniline (2 mols) <i>o</i> -Chloro-benzaldehyde [Oxidation]	B
497	New Fast Green 2B Victoria Green 3B	I '14:— 44,595	Dimethyl-aniline (2 mols) 2: 5-Dichloro-benzalde- hyde [Oxidation]	B

Dyes Derived from Dimethyl-aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
510	TRIPHENYL-METHANE DYES ( <i>continued</i> ) Azo Green		Dimethyl-aniline (2 mols) <i>m</i> -Nitro-benzaldehyde Salicylic Acid [Oxidation]	M
515	Methyl Violet	I '14:—255,063 M '17:—375,107 M '18:—632,196 M '19:—574,436 I '20:— 3,312 M '20:—600,873	Dimethyl-aniline (3 mols) [Phenol] [Oxidation]	B
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Ketone or Dimethyl-aniline (3 mols) Phosgene or Hydrol [Oxidation]	B
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 I '20:— 3,313 M '17:— ?	[Benzylation of Methyl Violet] or Benzyl-chloride Dimethyl-aniline (3 mols) [Phenol]	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] or Dimethyl-aniline (3 mols) [Phenol and Methyl Chloride]	B

Dyes Derived from Dimethyl-aniline (*continued*)

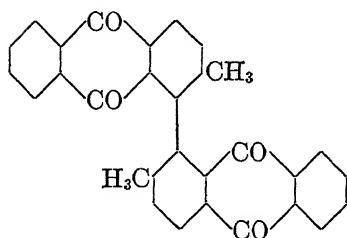
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
523	TRIPHENYL-METHANE DYES ( <i>continued</i> ) Fast Green	I '14:— 14,347 I '20:— 10,461	<i>m</i> -Nitro-benzaldehyde Dimethyl-aniline (2 mols) Benzyl-chloride (2 mols) [Sulfonation, Oxidation]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	<i>p</i> -Dimethylamino- benzaldehyde <i>m</i> -Xylene	A
659	THIAZINE DYES Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline (2 mols) [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.] <i>or</i> Nitroso-dimethyl- aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.] <i>or</i> Dimethyl- <i>p</i> -phenylene- diamine [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,049	Dimethyl-aniline (2 mols) [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Nitration] <i>or</i> Nitroso-dimethyl- aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.; Nitra- tion] <i>or</i> Dimethyl- <i>p</i> -phenylene- diamine [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.; Nitra- tion] <i>or</i> [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 330	Ethyl-methyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B

*N*: *N*-Dimethyl-*p*: *p*'-azo-bisaniline (*C. A. nomen.*)

See, Dimethyl-*p*: *p*'-diamino-azo-benzene

**2: 2'-Dimethyl-1: 1'-bianthraquinone** (*C. A. nomen.*)

2: 2'-Dimethyl-1: 1'-dianthraquinonyl



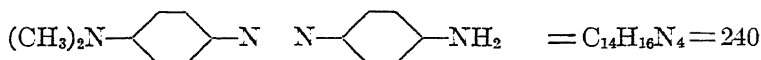
$$= C_{30}H_{18}O_4 = 442$$

**FORMATION.**—1-Amino-2-methyl-anthraquinone is dissolved in sulfuric acid and sodium nitrite added. The isolated and dried diazonium sulfate is stirred into acetic anhydride, and copper powder added. Nitrogen is evolved and the combination takes place, forming the bianthraquinone derivative

**LITERATURE.**—Lange, *Zwischenprodukte*, #3491–3493  
Cain, *Intermediate Products* (2d Ed.), 261

**Dyes Derived from 2: 2'-Dimethyl-1: 1'-bianthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
760	Indanthrene Gold Orange G Pyranthrone	I '14:— 20,092 I '20:— 7,617	[2 mols H <sub>2</sub> O removed]	V
761	Indanthrene Gold Orange R	I '14:— 50,496 I '20:— 35,338	[2 mols H <sub>2</sub> O removed, Chlorination] [or Pyranthrone 760, chlorinated]	V
762	Indanthrene Scarlet G	I '14:— 99 I '20:— 399	[2 mols H <sub>2</sub> O removed, Bromination] [or Pyranthrone 760, brominated]	V

**Dimethyl-*p*:*p'*-diamino-azo-benzene***N*:*N*-Dimethyl-*p*:*p'*-azo-bisaniline (*C. A. nomen.*)

FORMATION.—(1) By coupling of diazotized *p*-nitro-aniline with dimethyl-aniline and subsequent reduction with sodium sulfide.

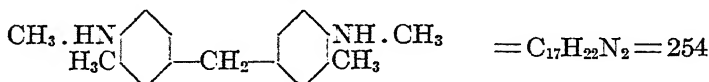
(2) By coupling of diazotized *p*-amino-acetanilide with dimethylaniline and splitting off of acetyl group

LITERATURE.—Heumann, Anilinfarben, 3, 1467; 4, 1026

*Cf.* Lange, Zwischenprodukte, #1760

**Dye Derived from Dimethyl-*p*:*p'*-diamino-azo-benzene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
239	DISAZO DYE Azotol C		$\beta$ -Naphthol	MF

**4:4'-Dimethyl-diamino-3:3'-ditolyl-methane**Dimethyl-diamino-di-*o*-tolyl-methane4:4'-Methylene-bis(*N*-methyl-*o*-toluidine) (*C. A. nomen.*)

FORMATION.—By condensing formaldehyde and two molecules of methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 104

Lange, Zwischenprodukte, #1318

**Dye Derived from 4:4'-Dimethyl-diamino-3:3'-ditolyl-methane**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
494	AURAMINES Auramine G	I '14:— 1,902	[Sulfur, Ammonium chloride, etc.]	B



**Dimethyl-diamino-di-o-tolyl-methane**

*See, 4: 4'-Dimethyl-diamino-3: 3'-ditolyl-methane*

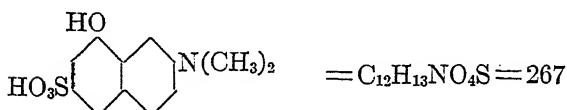
**2: 2-Dimethyl-1: 1'-dianthraquinonyl**

*See, 2: 2'-Dimethyl-1: 1'-bianthraquinone (C. A. nomen.)*

**Dimethyl-gamma Acid**

2-Dimethylamino-8-naphthol-6-sulfonic Acid

7-Dimethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



FORMATION.—G acid is heated with dimethylamine in an autoclave around 200°, the dimethylamino-G acid thus obtained is fused with caustic soda at 210–220°, and the dimethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

**Dyes Derived from Dimethyl-gamma Acid**

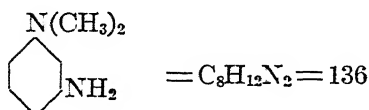
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
206	MONOAZO DYE Diphenyl Catechine G	I '14:— 8,642	<i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid <i>p</i> -Phenylene-diamine [Diphenyl Orange RR]	D
348	DISAZO DYES Diphenyl Brown BN	I '14:— 13,471	Salicylic Acid Benzidine	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Tolidine	D

*N: N-Dimethyl-p-nitroso-aniline (C. A. nomen.)*

*See, p-Nitroso-dimethyl-aniline*

*N*: *N*-Dimethyl-*m*-phenylene-diamine (*C. A. nomen.*)

*m*-Amino-dimethyl-aniline



FORMATION.—Dimethyl-aniline is nitrated with mixed acid, and the *m*-nitro-dimethyl-aniline separated from the para isomer. The *m*-derivative is now reduced to dimethyl-*m*-phenylene-diamine

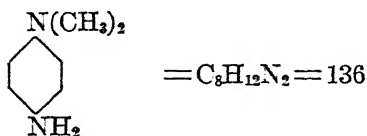
LITERATURE.—Green, *Organic Coloring Matter* (1908), 32

**Dyes Derived from *N*: *N*-Dimethyl-*m*-phenylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
603	ACRIDINE DYES Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	Dimethyl- <i>m</i> -phenylene-diamine (2 mols) [Formaldehyde, Oxidation, etc.]	B
604	Acridine Orange R		Dimethyl- <i>m</i> -phenylene-diamine (2 mols) Benzaldehyde [Ammonia removal; Oxidation]	B

*N*: *N*-Dimethyl-*p*-phenylene-diamine (*C. A. nomen.*)

*p*-Amino-dimethyl-aniline



STATISTICS.—Imported '14:—very small  
 Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '20:—314,931

FORMATION.—Dimethyl-aniline by action of nitrous acid forms nitroso-dimethyl-aniline, which by reduction with zinc dust and hydrochloric acid furnishes dimethyl-*p*-phenylene-diamine

LITERATURE.—Lange, Zwischenprodukte, #561-563

**Dyes Derived from *N*:*N*-Dimethyl-*p*-phenylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
62	MONOAZO DYES Azogalleine		Pyrogallol	M
63	Azo Acid Blue	I '14:— 45,098 I '20:— 4,485	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	M
619	INDOPHENOL Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	$\alpha$ -Naphthol [Oxidation]	V
627	OXAZINE AND THIAZINE DYES Modern Cyanine		Nitroso-dimethyl-aniline Gallamide	M
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.] [Nitration] or [Methylene Blue nitrated]	B
661	Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B

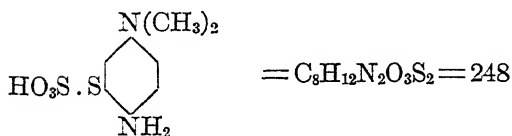
Dyes Derived from *N*:*N*-Dimethyl-*p*-phenylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
<b>AZINE DYES</b>				
669	Neutral Violet		Dimethyl- <i>p</i> -phenylene-diamine (2 mols) <i>m</i> -Phenylene-diamine	B
670	Neutral Red	M '18:— ?	<i>m</i> -Tolylene-diamine	B
680	Methylene Violet BN	I '14:— 1,521 M '17:— ? I '20:— 33	Aniline (2 mols) [Oxidation]	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 509 M '20:— 31,620	Dimethyl- <i>p</i> -phenylene-diamine (2+mols) [Oxidation]	B
683	Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Aniline <i>o</i> - or <i>p</i> -Toluidine [Oxidation]	B
690	Diphen Blue R Metaphenylene Blue R	I '20:— 3,124	<i>sym</i> -Di- <i>p</i> -tolyl- <i>m</i> -phenylene-diamine [Oxidation]	B
<b>SULFUR DYES</b>				
729	Kryogene Pure Blue R		Aniline (2 mols) [S+Na <sub>2</sub> S]  or [Methylene Violet; S+Na <sub>2</sub> S]	S
731	Thiophor Indigo CJ		$\alpha$ -Naphthol [S+Na <sub>2</sub> S]	S

*N*:*N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid*p*-Amino-dimethyl-aniline-thiosulfonic Acid

1-Amino-4-dimethylamino-benzene-2-thiosulfonic Acid

2-Amino-5-dimethylamino-benzene-thiosulfonic Acid (C. A. nomen.)



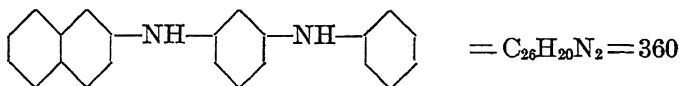
FORMATION.—10 parts of dimethyl-*p*-phenylene-diamine sulfate are dissolved in 100 parts of water and cooled to 0°, and a cold solution of 5.5 parts of potassium bichromate in 60 parts of water and 18 parts by volume of 50 per cent acetic acid, is introduced quickly during agitation. To the crystal mass is now added at once a solution of 22 parts of sodium thiosulfate and 27 parts of aluminum sulfate in 70 parts of water, and the mixture agitated at 10–20°. Upon cooling to 0° the desired product separates out

LITERATURE.—Lange, Zwischenprodukte, #931

**Dyes Derived from *N*:*N*-Dimethyl-*p*-phenylene-diamine-thiosulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
661	THIAZINE DYES Thionine Blue G O	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline	B
664	Lenco-gallo Thionine DH		Gallic Acid	M
665	Urania Blue	I '14:— 132	<i>N</i> : <i>N'</i> -Di-2-naphthyl- <i>m</i> -phenylene-diamine	A
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1:2-Naphthoquinone-4:6-disulfonic Acid	M

***N*:*N'*-Di-2-naphthyl-*m*-phenylene-diamine**



FORMATION.—108 parts of *m*-phenylene-diamine, 432 parts of  $\beta$ -naphthol and 2-3 parts of iodine are heated together at 200° and finally at 260°. The melt is powdered, and washed successively with dilute caustic soda, hydrochloric acid, water, alcohol, and ether. The residue is crystallized from aniline. Yield good

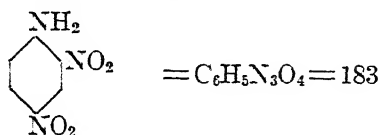
LITERATURE.—Lange, Zwischenprodukte, #2875, 2876

### Dyes Derived from *N:N'*-Di-2-naphthyl-*m*-phenylene-diamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
665	THIAZINE DYE Urania Blue	I '14:— 132	Dimethyl- <i>p</i> -phenylene-diamine-thiosulfonic Acid	A
692	AZINE DYE Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	Nitroso-dimethyl-aniline	A

### 2:4-Dinitro-aniline (C. A. nomen.)

*m*-Dinitro-aniline



FORMATION.—Aniline is condensed with phthalic acid, and the phthal-anil dinitrated. Upon heating the latter product with aniline under pressure the 2:4-dinitro-aniline is split off

LITERATURE.—Lange, Zwischenprodukte, #539

### Dyes Derived from 2:4-Dinitro-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
59	MONOAZO DYE Wool Violet S	I '14:— 308 M '18:— ? M '19:— ?	Diethyl-aniline- <i>m</i> -sulfonic Acid	A

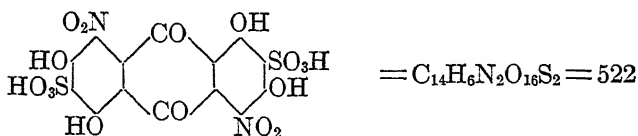
***m*-Dinitro-aniline**

See, 2: 4-Dinitro-aniline (*C. A. nomen.*)

***p*-(2: 4-Dinitro-anilino)-phenol (*C. A. nomen.*)**

See, 2: 4-Dinitro-4'-hydroxy-diphenylamine

**4: 8-Dinitro-anthrachryson-2: 6-disulfonic Acid**



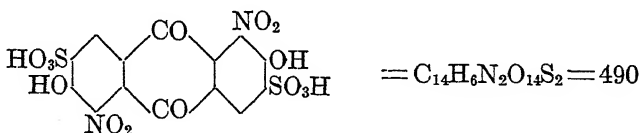
FORMATION.—Anthrachryson is sulfonated and nitrated

LITERATURE.—Green, *Organic Coloring Matters* (1908), #554 and #557

**Dye Derived from 4: 8-Dinitro-anthrachryson-2: 6-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
796	ANTHRAQUINONE AND ALLIED DYE Acid Alizarin Green G	I '20:— 1,334	[Sodium sulfide reduction]	ACr

**1: 5-Dinitro-anthraflavic-3: 7-disulfonic Acid**



FORMATION.—By the sulfonation and nitration of anthraflavic acid (which is prepared by heating *m*-hydroxy-benzoic acid with sulfuric acid at 190° C.)

LITERATURE.—Thorpe, *Dic. Chemistry*, 1, 84

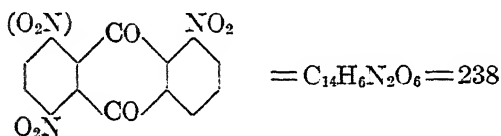
Cf. Bucherer, *Lehrbuch des Farbenchemie*, 339 (1914)

## Dye Derived from 1:5-Dinitro-anthraflavic-3:7-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
857	ANTHRAQUINONE AND ALLIED DYES Erweco Alizarin Acid Blue R		Aniline (2 mols) [Sulfonation]	ACr

## Dinitro-anthraquinone

(1:5-and 1:8-Dinitro-anthraquinones)



STATISTICS.—Manufactured '19:— ?

FORMATION.—The mixed compounds are obtained from anthraquinone, by nitration in sulfuric acid solution, and by pouring the nitration product into water

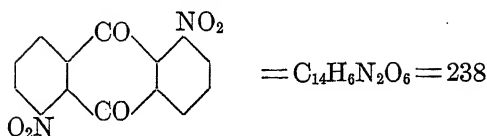
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253

## Dyes Derived from Dinitro-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
749	SULFUR DYE Anthraquinone Black		[S+Na <sub>2</sub> S]	S
790	ANTHRAQUINONE AND ALLIED DYES Anthracene Blue	I '14:— 26,642 I '20:— 3,539	[Sulfonation, Oxidation]	ACr
801	Anthracene Blue WGG	I '20:— 1,500	[Oxidation]	M
802	Anthracene Blue WG new		[Oxidation]	M



1:5-Dinitro-anthraquinone



STATISTICS.—Manufactured '20:— ?

FORMATION.—From anthraquinone in sulfuric acid solution by nitration with  $\text{HNO}_3$  or  $\text{NaNO}_3$ . The mixed 1:5 and 1:8 dinitro-anthraquinones are recovered by pouring the nitration mixture into water. By extraction of the mixed dinitro-compounds with acetone or alcohol, the 1:5-dinitro-anthraquinone is left behind

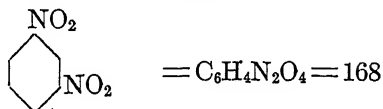
LITERATURE.—Cain, Intermediate Products (2d Ed.), 253

Lange, Zwischenprodukte, #3218

Dyes Derived from 1:5-Dinitro-anthraquinone

<i>Schutz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
749	SULFUR DYE Anthraquinone Black		[S+Na <sub>2</sub> S]	S
800	ANTHRAQUINONE AND ALLIED DYES Anthracene Blue WG	I '14:— 54,812 I '20:— 2,049	[Oxidation]	M
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	p-Toluidine (2 mols) [Sulfonation]	ACr

m-Dinitro-benzene



STATISTICS.—Imported '14:— 164,650 lbs.

Manufactured '17:—2,333,192 lbs.

Manufactured '18:—4,115,269 lbs.

Manufactured '19:—2,280,282 lbs.

Manufactured '20:—3,380,112 lbs.

FORMATION.—By nitration of nitro-benzene or of benzene, using mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32

Cf. Lange, Zwischenprodukte, #543

USES.—For the manufacture of *m*-nitro-aniline and *m*-phenylenediamine

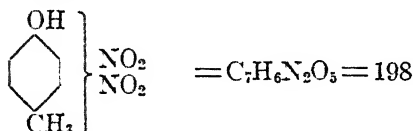
### 2:2'-Dinitro-*p*:*p'*-biacetanilide

See, Diacetyl-*o*:*o'*-dinitro-benzidine

### 2:4-Dinitro-chloro-benzene

See, 1-Chloro-2:4-dinitro-benzene (*C. A. nomen.*)

### Dinitro-*p*-cresol



FORMATION.—Probably by the dinitration of *p*-cresol

LITERATURE.—Cf. Thorpe, 2, 165

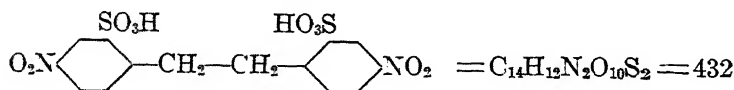
Cf. Lange, Schwefelfarbstoffe, 132, 381

### Dye Derived from Dinitro-*p*-cresol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
725	SULFUR DYE Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	[S+Na <sub>2</sub> S]	S

### Dinitro-dibenzyl-disulfonic Acid

2:2'-Ethylene-bis(5-nitro-benzene-sulfonic Acid) (*C. A. nomen.*)



FORMATION.—12 parts of sodium *p*-nitro-toluene-sulfonate are dissolved in 50 parts of hot water, and treated with 100 parts of sodium hypochlorite solution (2 per cent HOCl) and 50 parts of caustic soda solution (40°) at 70°. At end of reaction, cooled with ice to 40° and after crystallizing several hours, the product is filtered off.

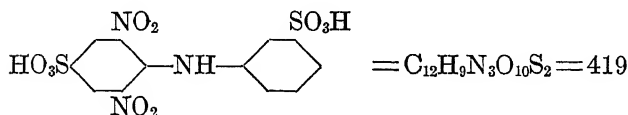
LITERATURE.—Lange, Zwischenprodukte, #1460

**Dyes Derived from Dinitro-dibenzyl-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
10	STILBENE DYES			
	Mikado Yellow	I '14:— 85,795	Dinitro-dibenzyl-disulfonic Acid (2 mols)	D
	Stilbene Yellow	M '18:— ? M '20:— ?		
12	Diphenyl Citronine G		Aniline	D
18	Diphenyl Fast Yellow	I '14:— 10,229	Dehydrothio-toluidine-sulfonic Acid (2 mols) or Primuline-sulfonic Acid (2 mols)	D
		I '20:— 1,102		

**2: 5-Dinitro-diphenylamine-3': 4-disulfonic Acid**

3: 5-Dinitro-3': 4-imino-bis(benzene-sulfonic Acid) (*C. A. nomen.*)



FORMATION.—By reaction of 1-chloro-2: 6-dinitro-benzene-4-sulfonic acid and metanilic acid in presence of sodium acetate

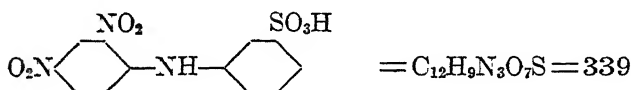
LITERATURE.—Lange, Zwischenprodukte, #1712

Cf. Schultz, Farbstofftabellen, #542

## Dye Derived from 2:5-Dinitro-diphenylamine-3':4-disulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
542	TRIPHENYL-METHANE DYE Agalma Green B	I '14:— 2,294	Hydrol	A

## 2:4-Dinitro-diphenylamine-3'-sulfonic Acid

N-(2:4-Dinitro-phenyl)-metanilic Acid (*C. A. nomen.*)

FORMATION.—From chloro-dinitro-benzene and metanilic acid

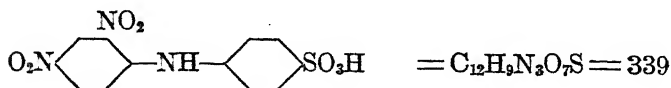
LITERATURE.—Lange, Zwischenprodukte, #1673

Cf. Schultz, Farbstofftabellen (1914), #738

## Dye Derived from 2:4-Dinitro-diphenylamine-3'-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
738	SULFUR DYE Cotton Black		[S+Na <sub>2</sub> S]	S

## 2:4-Dinitro-diphenylamine-4'-sulfonic Acid

N-(2:4-Dinitro-phenyl)-sulfanilic Acid (*C. A. nomen.*)

FORMATION.—From chloro-dinitro-benzene and sulfanilic Acid

LITERATURE.—Lange, Zwischenprodukte, #1673

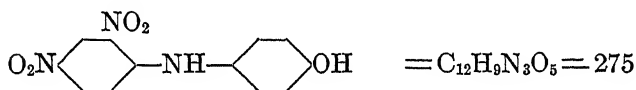
Cf. Schultz, Farbstofftabellen, #738

**Dye Derived from 2: 4-Dinitro-diphenylamine-4'-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
738	SULFUR DYE Cotton Black		[S+Na <sub>2</sub> S]	S

**2: 4-Dinitro-4'-hydroxy-diphenylamine**

*p*-(2: 4-Dinitro-anilino)-phenol (*C. A. nomen.*)



STATISTICS.—Manufactured 1919 but amount not disclosed

FORMATION.—From chloro-dinitro-benzene and *p*-amino-phenol by boiling molecular proportions in an aqueous suspension with slightly more than the theoretical amount of limestone

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73  
Lange, Zwischenprodukte, #1670

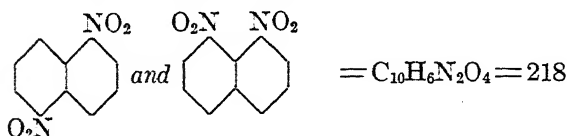
**Dyes Derived from 2: 4-Dinitro-4'-hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
724	SULFUR DYES Immedial Black	I '14:— 54,696 M '18:— ?	[S+Na <sub>2</sub> S]	S
725	Immedial Dark Brown A Immedial Brown B	I '14:— 23,887 M '18:— ?	[NaOH; S+Na <sub>2</sub> S]	S
726	Pyrogene Direct Blue Pyrogene Blue	I '14:— 10,934 I '20:— 2,498	[Alcohol; S+Na <sub>2</sub> S]	S

**3: 5-Dinitro-3': 4-imino-bis(benzene-sulfonic Acid) (*C. A. nomen.*)**

*See*, 2: 5-Dinitro-diphenylamine-3': 4-disulfonic Acid

## 1:5- and 1:8-Dinitro-naphthalenes



STATISTICS.—Imported '14:—very small amount

Manufactured '18:— ?

Manufactured '19:— ?

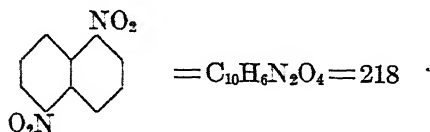
FORMATION.—From *a*-nitro-naphthalene by nitration

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170

## Dyes Derived from 1:5- and 1:8-Dinitro-naphthalenes

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
774	ANTHRAQUINONE AND ALLIED DYES			
	Alizarin Black	I '14:—205,439 I '20:— 17,421	[Oxidation]	M
775	Alizarin Dark Green W		Phenol [Oxidation]	M
776	Printing Black for Wool		[Reduction]	A

## 1:5-Dinitro-naphthalene

*a*-Dinitro-naphthaleneFORMATION.—*a*-Nitro-naphthalene is nitrated, resulting in formation of 1:5 and 1:8-dinitro-naphthalenes in the proportion of about

1:2. This crude product is washed with water and dried, and then extracted first with carbon disulfide to remove nitro-naphthalene, and second with acetone to remove the 1:8 isomer,—leaving behind the 1:5 isomer. (See 1:8-dinitro-naphthalene)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170

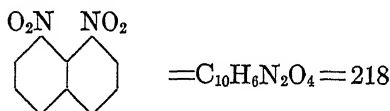
Lange, Zwischenprodukte, #2315

**Dyes Derived from 1:5-Dinitro-naphthalene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
745	SULFUR DYE Melanogene Blue		[S+N <sub>2</sub> S]	S
789	ANTHRAQUINONE AND ALLIED DYES Anthracene Blue WR	I '14:—107,778 I '20:—103,913 M '20:— ?	[Oxidation]	M

**1:8-Dinitro-naphthalene**

β-Dinitro-naphthalene



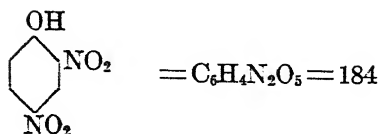
FORMATION.—α-Nitro-naphthalene is nitrated, resulting in the formation 1:5 and 1:8-dinitro-naphthalenes in the proportion of about 1:2. The nitration mass upon cooling deposits most of the 1:5-isomer, and upon pouring this filtrate into water the 1:8-isomer is precipitated, which can be purified by crystallization from benzene. (See 1:5-dinitro-benzene)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 170

Lange, Zwischenprodukte, #2315

## Dyes Derived from 1:8-Dinitro-naphthalene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermedic tes Used and Notes</i>	<i>Dye Appli- cation Class</i>
740	SULFUR DYES Fast Black B		[Na <sub>2</sub> S]	S
741	Fast Black BS		[Na <sub>2</sub> S; Alkalies] or [Fast Black B; Alkalies]	S
742	Printing Blue for Wool		[Na <sub>2</sub> S, NaHSO <sub>3</sub> , NaOH]	S
743	Kryogene Brown A		[Na <sub>2</sub> S, NaHSO <sub>3</sub> , NaOH; S+Na <sub>2</sub> S]	S
750	Kryogene Brown A, G	I '14:— 10,313	[NaHSO <sub>3</sub> ; S+Na <sub>2</sub> S]	S

***α*-Dinitro-naphthalene***See*, 1: 5-Dinitro-naphthalene***β*-Dinitro-naphthalene***See*, 1: 8-Dinitro-naphthalene***γ*-Dinitro-naphthalene**1: 3-Dinitro-naphthalene (*not considered herein*)***δ*-Dinitro-naphthalene**1: 6-Dinitro-naphthalene (*not considered herein*)**2: 4-Dinitro-phenol**

STATISTICS.—Manufactured '20:— ?



FORMATION.—From chloro-dinitro-benzene by boiling with sodium carbonate solution

LITERATURE.—Cain, Intermediate Products (2d Ed.), 113

Lange, Zwischenprodukte, #577, 1121

**Dyes Derived from 2:4-Dinitro-phenol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
720	SULFUR DYES Sulfur Black	I '14:— 4,923,981(?) M '17:— 9,298,631 M '18:— 12,385,130 M '19:— 14,504,770 I '20:— 662 M '20:— 16,305,037	[S+Na <sub>2</sub> S]	S
721	Sulfur Black Thio Cotton Black		[ <i>p</i> -Amino-phenol-sulfonic Acid] [S+Na <sub>2</sub> S]	S
722	Auronal Black	I '14:— 50,879	[S+Na <sub>2</sub> S]	S
723	Autogene Black EEB		[S+Na <sub>2</sub> S]	S

***N*-(2:4-Dinitro-phenyl)-metanilic Acid** (*C. A. nomen.*)

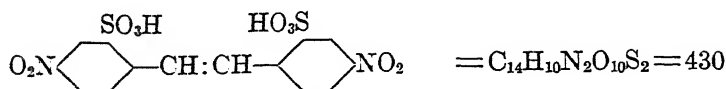
See, 2:4-Dinitro-diphenylamine-3'-sulfonic Acid

***N*-(2:4-Dinitro-phenyl)-*p*-phenylene-diamine** (*C. A. nomen.*)

See 4'-Amino-2:4-dinitro-diphenylamine

***N*-(2:4-Dinitro-phenyl)-sulfanilic Acid** (*C. A. nomen.*)

See 2:4-Dinitro-diphenylamine-4'-sulfonic Acid

**Dinitro-stilbene-disulfonic Acid**4: 4'-Dinitro-stilbene-2: 2'-disulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '19:— ?

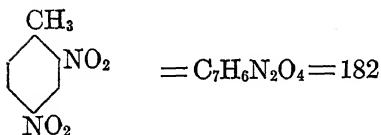
FORMATION.—*p*-Nitro-toluene-sulfonic acid is dissolved in weak caustic soda solution and oxidized with sodium hypochlorite solution. If the product contains dinitro-dibenzyl-disulfonic acid, it is again oxidized with sodium hypochlorite in caustic soda solution.

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 39Lange, *Zwischenprodukte*, #1453**Dyes Derived from Dinitro-stilbene-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
10	STILBENE DYES Mikado Yellow Stilbene Yellow	I '14:— 85,795	Dinitro-stilbene-disulfonic Acid (2 mols)	D
		M '18:— ?		
		M '20:— ?		
11	Mikado Orange Chloramine Orange G	I '14:— 26,010	Dinitro-stilbene-disulfonic Acid (2 mols) [Reduction]	D
		M '17:— ?		
		M '18:— ?		
		M '19:— ? M '20:— 38,287		
12	Diphenyl Citronine G		Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113	<i>p</i> -Phenylene-diamine (2 mols)	D
		M '18:— ?		
18	Diphenyl Fast Yellow	I '14:— 10,229	Dehydrothio-toluidine-sulfonic Acid (2 mols) or Primuline-sulfonic Acid (2 mols)	D
		I '20:— 1,102		

**2: 4-Dinitro-toluene** (*C. A. nomen.*)

*m*-Dinitro-toluene



STATISTICS.—Imported '14:—547,701

Manufactured '18:— ?

Manufactured '19:—746,266

Manufactured '20:—1,847,191

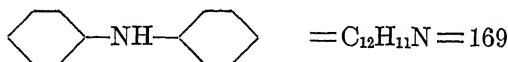
FORMATION.—From toluene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 34

Lange, Zwischenprodukte, #789

USES.—For manufacture of *m*-tolylene-diamine

**Diphenylamine**



STATISTICS.—Imported '14:—81,137

Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—By heating aniline and aniline hydrochloride together in an autoclave, provided with a replaceable acid-proof enamelled lining

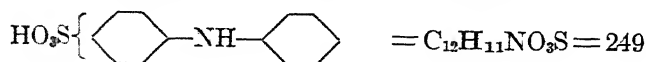
LITERATURE.—Cain, Intermediate Products (2d Ed.), 72

Lange, Zwischenprodukte, #1598-1600

## Dyes Derived from Diphenylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
134	MONOAZO DYES Metanil Yellow	I '14:—284,606	Metanilic Acid	A
		M '17:— ?		
		M '18:— ?		
		M '19:—477,143		
		I '20:— 8,456		
		M '20:—629,437		
135	Metanil Yellow, Brominated		Metanilic Acid [Bromination]	A
136	Acid Yellow MGS, GG		Metanilic Acid [Sulfonation]	A
139	Orange IV	I '14:— 19,020	Sulfanilic Acid	A
		M '19:— ?		
		I '20:— 608		
140	Azoflavine RS Curcumeine	I '14:— 39,869	Sulfanilic Acid [Nitration]	A
		I '20:— 5,225		
141	Azo Yellow 3G	I '14:—114,689	Sulfanilic Acid [Nitration]	A
		M '17:— ?		
		M '18:— ?		
		M '19:— ?		
		I '20:— 4,818		
		M '20:— ?		
142	Brilliant Yellow S Curcumeine	I '14:— 9,934	Sulfanilic Acid [Sulfonation]	A
150	Fast Yellow N		<i>p</i> -Toluidine- <i>o</i> -sulfonic Acid	A
203	Yellow Fast To Soap		<i>m</i> -Amino-benzoic Acid	M

## Diphenylamine-sulfonic Acid

Anilino-benzene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—By sulfonation of diphenylamine, and purification from the disulfonate formed simultaneously

LITERATURE.—Schultz, Die Chemie des Steinkohlentheers (3 aufl.), 1, 181

Lange, Zwischenprodukte, #1615–1617

**Dyes Derived from Diphenylamine-sulfonic Acid**

<i>Schulz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediaies Used and Notes</i>	<i>Dye Appli- cation Class</i>
538	TRIPHENYL-METHANE DYE Methyl Blue Cotton Blue	I '14:— 50,255	Diphenylamine-sulfonic Acid (3 mols)	B

**Diphenylene-imide**

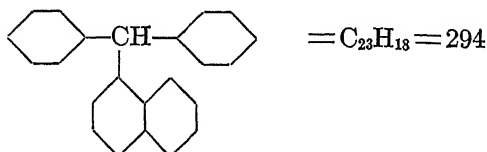
See, Carbazole

**Diphenyl-methyl-amine**

See, *N*-Methyl-diphenylamine (*C. A. nomen.*)

**Diphenyl-naphthyl-methane**

1-Naphthyl-diphenyl-methane (*C. A. nomen.*)



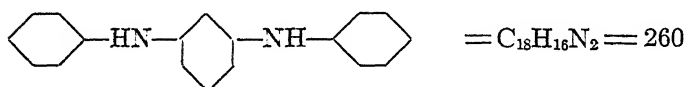
FORMATION.—From benzo-hydrol by heating with naphthalene and  $\text{P}_2\text{O}_5$  at  $140^\circ$ – $145^\circ$  for some hours

LITERATURE.—A. Lehne, Ueber die Condensation von Benzhydrol und Naphthalin, Ber, 13, 358 (1880)

Richter, Lex. d. Kohlenstoff Verbindungen, 4193

## Dye Derived from Diphenyl-naphthyl-methane

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
565	DIPHENYL-NAPHTHYL-METHANE DYE Acid Blue B Wool Blue G	I '14:—180,423 I '20:— 1,852 M '20:— ?	[Sulfonation]	A

*N: N'*-Diphenyl-*m*-phenylene-diamine (*C. A. nomen.*)*s*-Diphenyl-*m*-phenylene-diamine

FORMATION.—From resorcinol and aniline by heating together in presence of calcium chloride and a little zinc chloride at 210°

LITERATURE.—Green, *Organic Coloring Matters* (1908), 37

*Cf.* Schultz, *Farbstofftabellen*, #689

Dyes Derived from *N: N'*-Diphenyl-*m*-phenylene-diamine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
267	DISAZO DYES Phenylene Black		1-Naphthylamine-4:7-disulfonic Acid $\alpha$ -Naphthylamine	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid $\alpha$ -Naphthylamine	A
689	AZINE DYE Indazine M		Nitroso-dimethylaniline (1 and 2 mols)	B

**Diphenyl-thiourea**

*See*, Thio-carbanilide (*C. A. nomen.*)

**Disulfo Acid C**

2-Naphthylamine-4: 8-disulfonic Acid (*not considered herein*)

**Disulfo Acid E**

*See*, 1-Naphthol-3: 8-disulfonic Acid

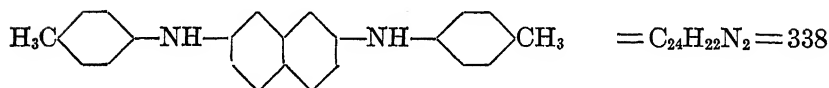
**Disulfo Acid F**

2-Naphthylamine-3: 7-disulfonic Acid (*not considered herein*)

**Disulfo Acid S**

*See*, 1-Naphthylamine-4: 8-disulfonic Acid

***N: N'-(p: p'-Ditolyl)-2: 7-naphthylene-diamine***



FORMATION.—By heating 2: 7-dihydroxy-naphthalene with *p*-toluidine and *p*-toluidine hydrochloride

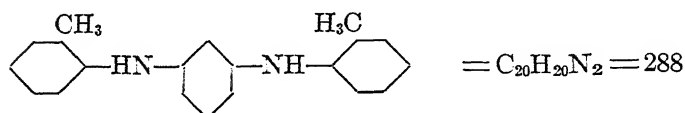
LITERATURE.—Green, Organic Coloring Matters (1908), 38  
Lange, Zwischenprodukte, #2886

**Dye Derived from *N: N'-(p: p'-Ditolyl)-2: 7-naphthylene-diamine***

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
677	AZINE DYE Basle Blue R		Nitroso-dimethyl-aniline	B

*N: N'-(o: o'-Ditolyl)-m-phenylene-diamine* (C. A. nomen.)

Di-*o*-tolyl-*m*-phenylene-diamine



FORMATION.—Presumably by heating resorcinol with *o*-toluidine in presence of condensing agent. Cf. Di-*p*-tolyl-*m*-phenylene-diamine

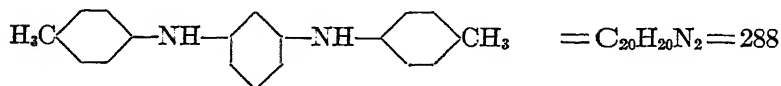
LITERATURE.—Ullmann, Enzy. tech. Chemie, 9, 63

**Dye Derived from *N: N'-(o: o'-Ditolyl)-m-phenylene-diamine***

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
691	AZINE DYE Metaphenylene Blue B	I '14:— 50	Nitroso-dimethyl-aniline	B

*N: N'-(p: p'-Ditolyl)-m-phenylene-diamine* (C. A. nomen.)

Di-*p*-tolyl-*m*-phenylene-diamine



FORMATION.—From resorcinol, *p*-toluidine, and *p*-toluidine hydrochloride by heating together in presence of calcium chloride and a little zinc chloride

LITERATURE.—Ullmann, Enzy. tech. Chemie, 9, 63

Green, Organic Coloring Matters (1908), 37



**Dye Derived from *N: N'*-(*p: p'*-Ditolyl)-*m*-phenylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
690	<p>        <b>AZINE DYE</b>  Diphen Blue R  Metaphenylene Blue R</p>	I '20:— 3,124	Dimethyl- <i>p</i> -phenylene-diamine	B

**D S**

*See*, Diamino-stilbene-disulfonic Acid

**D T**

*See*, Dehydro-thio-*p*-toluidine-sulfonic Acid

**Ebert and Merz  $\alpha$  Acid**

*See*, Naphthalene-2: 7-disulfonic Acid

**Ebert and Merz  $\beta$  Acid**

Naphthalene-2: 6-disulfonic Acid (*not considered here*)

**Epsilon Acid.**

*See*, 1-Naphthol-3: 8-disulfonic Acid

*See*, 1-Naphthylamine-3: 8-disulfonic Acid

and 1: 8-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

**Erdmann's  $\mu$  Acid**

*See*, 1-Naphthylamine-6-sulfonic Acid

**Ethoxy-benzidine**

Di-*p*-amino-ethoxy-diphenyl

2-Ethoxy-benzidine (*C. A. nomen. NH<sub>2</sub> = 1*)



FORMATION.—Aniline is diazotized and coupled with phenol-*p*-sulfonic acid and the product ethylated with ethyl bromide, thus forming,—benzene-azo-phenetole-sulfonic acid. This is then reduced in an aqueous solution with zinc dust and caustic soda followed by acidification with hydrochloric acid, resulting in preparation of ethoxy-benzidine-sulfonic acid which is heated in an autoclave with water (at 170°) to split out the sulfonic acid group

LITERATURE.—Weinberg, Ber. 20, 3171

Lange, Zwischenprodukte, #1224, 1249

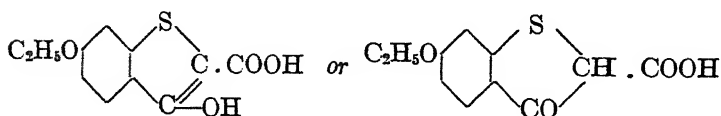
Heumann, Anilinfarben 4, 380

### Dyes Derived from Ethoxy-benzidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
401	DISAZO DYES Diamine Blue 3R		Neville-Winther's Acid (2 mols)	D
402	Diamine Blue Black E		2-Naphthol-3:7-disulfonic Acid Gamma Acid	D
403	Diamine Black BO		Gamma Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Salicylic Acid Phenol [Ethylation]	D

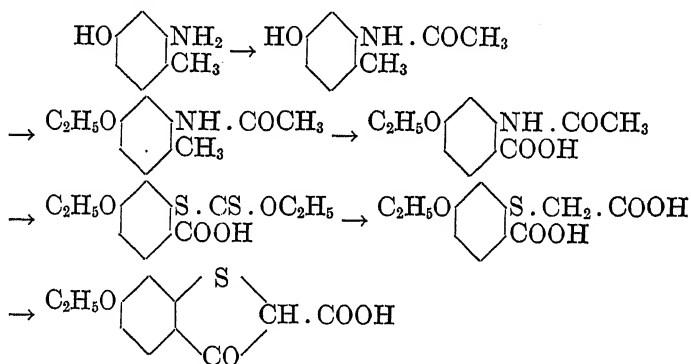
5-Ethoxy-2-hydroxy-*rh*ionaphthene-1-carboxylic Acid (*C. A. nomen.*)

6-Ethoxy-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)



$$= \text{C}_{11}\text{H}_{10}\text{O}_4\text{S} = 238$$

FORMATION.—5-Hydroxy-*o*-toluidine (amino-*p*-cresol) is acetylated to protect the amino group, and then ethylated with diethyl-sulfate for example. The resulting 2-acetamido-4-ethoxy-toluene is oxidized with potassium permanganate to 2-acetamido-4-ethoxy-benzoic acid. The acetyl group is split off by boiling with caustic soda, acid added, and the amino group diazotized with sodium nitrite, and reacted with potassium xanthate. This xanthate compound, upon being treated with sodium chloro-acetate and caustic soda, yields 5-ethoxy-phenyl-thioglycol-*o*-carboxylic acid. This latter heated with caustic soda condenses to 5-ethoxy-2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



LITERATURE.—Lange, Zwischenprodukte, #2167, 2168

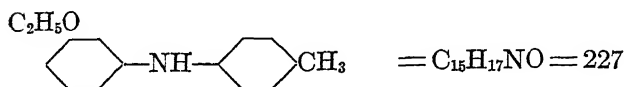
Georgievics and Grandmougin, Dye Chemistry, 437

**Dyes Derived from 5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
913	INDIGO GROUP DYES Helindone Orange R	I '14:— 14,511 I '20:— 3,155	5-Ethoxy-2-hydroxy- thionaphthene-1-car- boxylic Acid (2 mols)	V
915	Helindone Fast Scarlet R	I '14:— 4,302 I '20:— 3,748	5-Ethoxy-2-hydroxy- thionaphthene-1-car- boxylic Acid (2 mols) [Bromination]	V

**3-Ethoxy-4'-methyl-diphenylamine** (*C. A. nomen.*)

3-Ethoxy-phenyl-4'-tolyl-amine



FORMATION.—100 parts of *m*-hydroxy-phenyl-*p*-tolyl-amine, 20.5 parts of caustic soda solution (40° ?), 200 parts of alcohol, and 75 parts of ethyl chloride are heated together in an autoclave at 110–120° for 7–8 hours

LITERATURE.—Lange, *Zwischenprodukte*, #1624, 1625

**Dye Derived from 3-Ethoxy-4'-methyl-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
548	TRIPHENYL-METHANE DYE Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	Ketone [Sulfonation]	A

**2-Ethoxy-1-naphthylamine** (*C. A. nomen.*)

See, 1-Amino-2-naphthol Ethyl Ether

**3-Ethylamino-4-methyl-diphenylamine**

See, *N*<sup>3</sup>-Ethyl-*N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine

**7-Ethylamino-2-naphthalene-sulfonic Acid** (*C. A. nomen.*)

See, Ethyl-2-naphthylamine-7-sulfonic Acid

**2-Ethylamino-8-naphthol-6-sulfonic Acid**

See, Ethyl-gamma Acid

**7-Ethylamino-1-naphthol-3-sulfonic Acid** (*C. A. nomen.*)

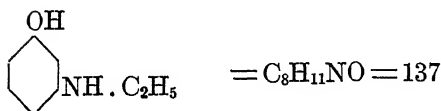
See, Ethyl-gamma Acid

**Ethyl-amino-naphthol-sulfonic Acid  $\gamma$**

*See, Ethyl-gamma Acid*

***m*-Ethylamino-phenol (C. A. nomen.)**

Ethyl-*m*-amino-phenol



FORMATION.—Ethyl-aniline is sulfonated with 23 per cent oleum, the sodium ethyl-aniline-*m*-sulfonate isolated and fused with caustic potash for ten hours at 200–220°

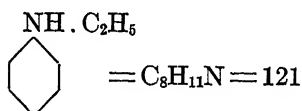
LITERATURE.—Cain, Intermediate Products (2d Ed.), 120  
Lange, Zwischenprodukte, #593–595

**Dyes Derived from *m*-Ethylamino-phenol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
571	XANTHONE DYES Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	<i>m</i> -Ethylamino-phenol (2 mols) Phthalic anhydride [Ethyl esterification]	B
577	Rhodine 2G		Dimethylamino - hydroxy - benzoyl - benzoic Acid [Ethyl esterification]	B

***N*-Ethyl-aniline (C. A. nomen.)**

Ethyl-aniline



STATISTICS.—Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '19:—195,161  
 Manufactured '20:— ?

FORMATION.—By heating aniline hydrochloride and ethyl alcohol together in an autoclave

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 67  
 Lange, *Zwischenprodukte*, #93

USES.—For preparation of ethyl-methyl-aniline and benzyl-ethyl-aniline

**$\alpha$ -(*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid** (*C. A. nomen.*)  
*See*, Ethyl-sulfobenzyl-aniline

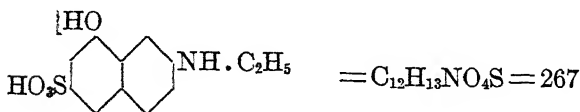
**Ethyl-benzyl-aniline**  
*See*, Benzyl-ethyl-aniline

**Ethyl-benzyl-aniline-sulfonic Acid**  
*See*, Ethyl-sulfobenzyl-aniline

**2:2'-Ethylene-bis (5-nitro-benzene-sulfonic Acid)** (*C. A. nomen.*)  
*See*, Dinitro-dibenzyl-disulfonic Acid

**Ethyl-F Acid**  
*See*, Ethyl-2-naphthylamine-7-sulfonic Acid

**Ethyl-gamma Acid**  
 2-Ethylamino-8-naphthol-6-sulfonic Acid  
 Ethylamino-naphthol-sulfonic Acid  $\gamma$   
 7-Ethylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



FORMATION.—G acid (2-naphthol-6:8-disulfonic acid) is heated with ethylamine in an autoclave at about 200°. The ethylamino-G acid thus obtained is fused with caustic soda at 210-220°, and the ethyl-gamma acid isolated

LITERATURE.—Lange, Zwischenprodukte, #2550

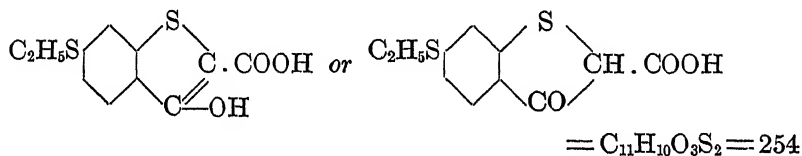
**Dye Derived from Ethyl-gamma Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
334	DISAZO DYE Diphenyl Blue Black	I '14:— 26,240	H Acid Benzidine	D

**5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid** (*C. A. nomen.*)

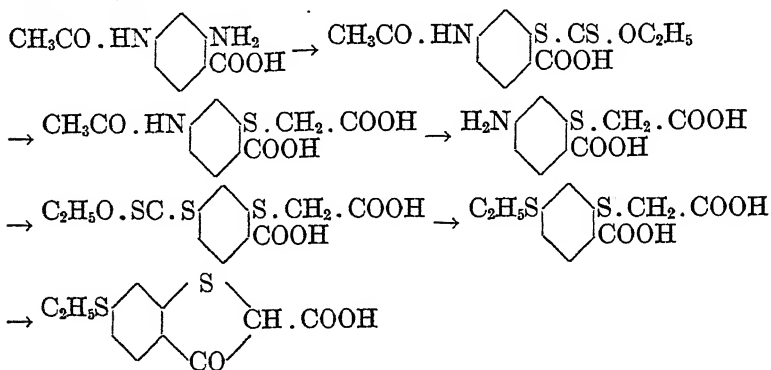
5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid

6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid (*German numbering*)



FORMATION.—4-Acetamido-anthranilic acid is diazotized and treated with potassium xanthate. This xanthate compound is reacted with chloro-acetic acid and then hydrolyzed to split the acetyl group from the 4-amino radical. This amino group is now diazotized and reacted with potassium xanthate. This second xanthate compound is treated with ethyl-sulfate, resulting in the formation of 5-ethylmercapto-phenyl-thioglycol-*o*-carboxylic acid. This latter, upon being heated with caustic soda, condenses to 5-ethylmercapto-

2-hydroxy-thionaphthene-1-carboxylic acid. The successive reaction steps are as follows:—



LITERATURE.—Georgievics and Grandmougin, *Dye Chemistry*, 436–437  
Lange, *Zwischenprodukte*, #2175

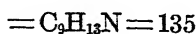
**Dye Derived from 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates used and Notes</i>	<i>Dye Application Class</i>
916	INDIGO GROUP DYES Helindone Scarlet S	I '14:— 5,515 I '20:— 56	5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (2 mols)	

*N*-Ethyl-*N*-methyl-aniline (*C. A. nomen.*)

Ethyl-methyl-aniline

Methyl-ethyl-aniline



FORMATION.—From ethyl-aniline by methylation, or from methyl-aniline by ethylation

LITERATURE.—Beil. II, 334

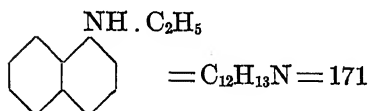


Dye Derived from Ethyl-methyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Noies</i>	<i>Dye Appli- cation Class</i>
661	THIAZINE DYE Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Dimethyl- <i>p</i> -phenylene- diamine-thiosulfonic Acid [Oxidation, etc.] or Nitroso-dimethyl- aniline [Reduction, Oxidation, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.] or Dimethyl- <i>p</i> -phenylene- diamine [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , Oxidation, etc.] or Dimethyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B

Ethyl- $\alpha$ -naphthylamine

*N*-Ethyl-1-naphthylamine (*C. A. nomen.*)



STATISTICS.—Imported '14:—1,102 lbs.

FORMATION.—By treating  $\alpha$ -naphthylamine with ethyl bromide

LITERATURE.—Limpricht, *Ann.* **99**, 117 (1856)

Friedlaender and Welmans, *Ber.* **21**, 3124 (1888)

Bamberger and Helwig, *Ber.* **22**, 1315 (1889)

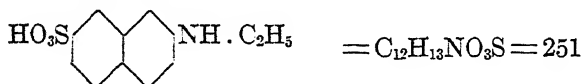
Thorpe, *Dic. Chemistry*, **3**, 587

Dyes Derived from Ethyl- $\alpha$ -naphthyl-amine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
186	MONOAZO DYE Lanacyl Violet B	I '14:— 3,628 M '17:— ? M '18:— ?	H Acid	A
558	DIPHENYL-NAPHTHYL-METHANE-DYE Victoria Blue R	I '14:— 4171 I '20:— 97	Hydrol or Ketone	B

## Ethyl-2-naphthylamine-7-sulfonic Acid

Ethyl-F Acid

Ethyl- $\beta$ -naphthylamine- $\delta$ -sulfonic Acid7-Ethylamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—By ethylation of 2-naphthylamine-7-sulfonic acid by means of an ethyl halide or sodium ethyl sulfate, in an autoclave at 100–110° C. for several hours

LITERATURE.—Lange, Zwischenprodukte, #2385

## Dyes Derived from Ethyl-2-naphthylamine-7-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
231	DISAZO DYES Cloth Red 3B Extra	I '14:— 15 I '20:— 84	<i>o</i> -Amino-azo-toluene	M
371	Roseazurine G		Tolidine 2-Naphthylamine-7-sulfonic Acid	D
372	Rosazurine B		Tolidine Ethyl-2-naphthylamine-7-sulfonic Acid (2 mols)	D

**Ethyl- $\beta$ -naphthylamine- $\delta$ -sulfonic Acid**

See, Ethyl-2-naphthylamine-7-sulfonic Acid

**N-Ethyl-*p*-nitroso-aniline** (*C. A. nomen.*)

See, *p*-Nitroso-ethyl-aniline

**N-Ethyl-4-nitroso-*o*-toluidine** (*C. A. nomen. NHR = 1*)

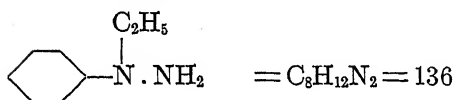
See, Nitroso-ethyl-*o*-toluidine

**N-Ethyl-N-phenyl-benzylamine** (*C. A. nomen.*)

See, Benzyl-ethyl-aniline

**Ethyl-phenyl-hydrazine**

$\alpha$ -Ethyl- $\alpha$ -phenyl-hydrazine (*C. A. nomen.*)



FORMATION.—Phenyl-hydrazine is treated with metallic sodium to form the sodium compound, from which by means of ethyl iodide the ethyl-phenyl-hydrazine is prepared

LITERATURE.—Thorpe, Dic. Chemistry, 3, 53

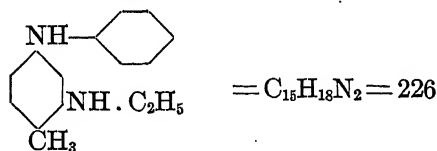
**Dye Derived from Ethyl-phenyl-hydrazine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
130	MONOAZO DYE Chromazone Blue R		<i>p</i> -Amino-benzaldehyde Chromotropic Acid	M

**N<sup>3</sup>-Ethyl-N<sup>1</sup>-phenyl-4-*m*-tolylene-diamine** (*NH<sub>2</sub> = 1, C. A. nomen.*)

Phenyl-*p*-amino-ethyl-*o*-toluidine (*CH<sub>3</sub> = 1*)

3-Ethylamino-4-methyl-diphenylamine



FORMATION.—*N*<sup>1</sup>-Phenyl-4-*m*-tolylene-diamine (*q.v.*) is heated for ten hours with ethyl bromide at 150–175°

LITERATURE.—Ger. Pat. 87,667, Frdl. IV, 85

Beilstein, *Organische Chemie* (3 auf.), IV spl. 400

Lange, *Zwischenprodukte*, #1750, 1755, referring to the same patent, gives a different formula

**Dye Derived from *N*<sup>3</sup>-Ethyl-*N*<sup>1</sup>-phenyl-4-*m*-tolylene-diamine**

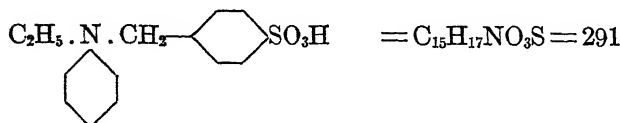
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates and Notes</i>	<i>Dye Application Class</i>
684	AZINE DYE Brilliant Rhoduline Red		Nitroso-ethyl- <i>o</i> -toluidine	B

**Ethyl-sulfobenzyl-aniline**

Benzyl-ethyl-aniline-sulfonic Acid

Ethyl-benzyl-aniline-sulfonic Acid

*α*-(*N*-Ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



STATISTICS.—Manufactured 1919 and 1920, but in undisclosed quantities

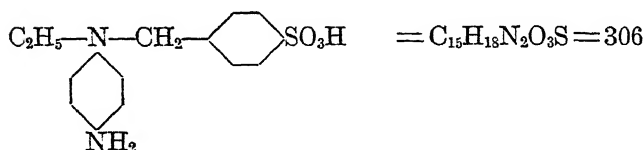
FORMATION.—By sulfonation of benzyl-ethyl-aniline with 20 per cent oleum at 40–50°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 69

*Cf.* Lange, *Zwischenprodukte*, #1500

## Dyes Derived from Ethyl-sulfobenzyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
50	MONOAZO DYE Azo Cardinal G	M '14:— ?	<i>p</i> -Nitro-aniline	A
502	TRIPHENYL-METHANE DYES Guinea Green Acid Green 2BG	I '14:— 49,971 M '17:— ? M '18:— ? M '19:— ? I '20:— 278 M '20:— ?	Ethyl-sulfobenzyl- aniline (2 mols) Benzaldehyde [Oxidation]	A
503	Night Green A Neptune Green Brilliant Milling Green B	I '14:— 40,868 M '19:— ? I '20:— 10,940 M '20:— ?	Ethyl-sulfobenzyl- aniline (2 mols) <i>o</i> -Chloro-benzaldehyde [Oxidation]	A
506	Erioglaucine	I '14:— 66,526 M '19:— ? I '20:— 6,160 M '20:— ?	Ethyl-sulfobenzyl- aniline (2 mols) Benzaldehyde- <i>o</i> - sulfonic Acid [Oxidation]	A
529	Acid Violet 6B		Ethyl-sulfobenzyl- aniline (2 mols) Dimethyl- <i>p</i> -amino- benzaldehyde [Oxidation]	A
530	Acid Violet 6B Formyl Violet Guinea Violet	I '14:—161,624 M '17:— ? M '18:— ? M '19:— ? I '20:— 3,925 M '20:—144,207	Diethyl-aniline Ethyl-sulfobenzyl- aniline (2 mols) [Oxidation]	A
662	THIAZINE DYE Thiocarmine R	I '14:— 1,399	Ethyl-sulfobenzyl- <i>p</i> - phenylene-diamine [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	A

***N*-Ethyl-*N*-(*p*-sulfo-benzyl)-metanilic Acid (*C. A. nomen.*)***See*, Benzyl-ethyl-aniline-disulfonic Acid**Ethyl-sulfobenzyl-*p*-phenylene-diamine**Benzyl-ethyl-*p*-phenylene-diamine-sulfonic Acid*p*-Amino-benzyl-ethyl-aniline-sulfonic Acid $\alpha$ -(*p*-Amino-*N*-ethyl-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

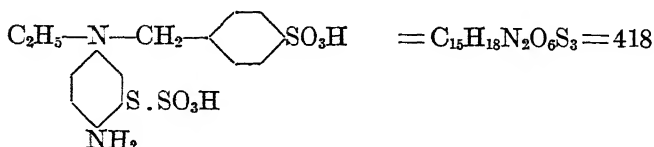
FORMATION.—Benzyl-ethyl-aniline-sulfonic acid is changed into the nitroso-derivative with nitrous acid, and this latter is reduced with sulfite

LITERATURE.—Lange, Zwischenprodukte, #1499, 929

*Cf.* Cain, Intermediate Products (2d Ed.), 69

**Dye Derived from Ethyl-sulfobenzyl-*p*-phenylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
662	THIAZINE DYE Thocarmin R	I '14:— 1,399	Ethyl-sulfobenzyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	A

**Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid** $\alpha$ -(4-Amino-*N*-ethyl-3-sulfomercapto-anilino)-*p*-toluene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—Ethyl-sulfobenzyl-*p*-phenylene-diamine is dissolved in dilute hydrochloric acid, zinc chloride solution and sodium thio-sulfate solution added; and then oxidized quickly with solution of sodium bichromate

LITERATURE.—Lange, Zwischenprodukte, #1501

**Dye Derived from Ethyl-sulfobenzyl-*p*-phenylene-diamine-thiosulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
667	THIAZINE DYE Brilliant Alizarin Blue Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	1: 2-Naphthoquinone	M

**5-Ethylthio-2-hydroxy-thionaphthene-1-carboxylic Acid**

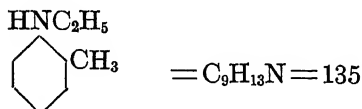
See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

**6-Ethylthio-3-hydroxy-1-thionaphthene-2-carboxylic Acid** (*German numbering*)

See, 5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid (*C. A. nomen.*)

***N*-Ethyl-*o*-toluidine** (*C. A. nomen.*)

Ethyl-*o*-toluidine

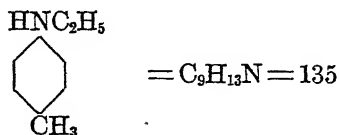


FORMATION.—From *o*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave at about 200°. The crude product contains considerable *o*-toluidine, which can be removed as sulfate by adding just sufficient sulfuric acid to combine with it, allowing to cool, and centrifugating

LITERATURE.—Cain, Intermediate Products (2d Ed.), 71  
Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Ethyl-*o*-toluidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES			
500	Setocyanine O	I '14:— 923 I '20:— 1,102	Ethyl- <i>o</i> -toluidine (2 mols) <i>o</i> -Chloro-benzaldehyde [Oxidation]	B
546	Cyanol	I '14:— 40,015 I '20:— 7,954	Ethyl- <i>o</i> -toluidine (2 mols) <i>m</i> -Hydroxy-benzalde- hyde [Sulfonation, Oxidation]	A
	THIAZINE DYE			
663	New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl- <i>o</i> -toluidine (2 mols) [Nitroso-derivative, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.] or <i>p</i> -Amino-ethyl- <i>o</i> - toluidine [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B

*N*-Ethyl-*p*-toluidine (*C. A. nomen.*)Ethyl-*p*-toluidine

FORMATION.—From *p*-toluidine hydrochloride and ethyl alcohol by heating together in an autoclave and purification of resulting product

LITERATURE.—*Cf.* Cain, *Intermediate Products* (2d Ed.), 71  
 Lange, *Zwischenprodukte*, #128  
 Ger. Pat. 21,241, *Frdl.* 1, 21

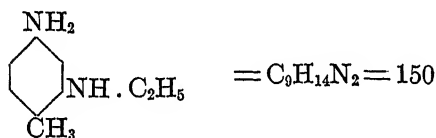


**Dye Derived from *N*-Ethyl-*p*-toluidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
671	AZINE DYE Induline Scarlet	I '14:— 198 I '20:— 154	$\alpha$ -Naphthylamine	

***N*<sup>3</sup>-Ethyl-4-*m*-tolylene-diamine** (*C. A. nomen.*  $NH_2=1$ )

*p*-Amino-ethyl-*o*-toluidine ( $CH_3=1$ )



FORMATION.—From 5-nitro-ethyl-*o*-toluidine ( $NH_2=1$ ) [4-nitro-ethyl-*o*-toluidine ( $CH_3=1$ )] by reduction with zinc dust and hydrochloric acid

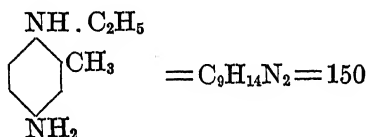
LITERATURE.—Beilstein, *Organische Chemie* (3 auf.), IV, 601  
J. Chem. Soc., **67**, 247

**Dye Derived from *N*<sup>3</sup>-Ethyl-4-*m*-tolylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
684	AZINE DYE Brilliant Rhoduline Red		Methyl- <i>o</i> -toluidine Aniline	B

***N*<sup>1</sup>-Ethyl-*p*-tolylene-diamine** (*C. A. nomen.*)

*p*-Amino-ethyl-*o*-toluidine



FORMATION.—From 4-nitroso-ethyl-*o*-toluidine (NHR=1) by reduction with  $\text{SnCl}_2 + \text{HCl}$

LITERATURE.—Beil. II, 609

**Dye Derived from *N*<sup>1</sup>-Ethyl-*p*-tolylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
663	THIAZINE DYE New Methylene Blue N	I '14:— 30,392 I '20:— 513	Ethyl- <i>o</i> -toluidine [ $\text{Na}_2\text{S}_2\text{O}_3$ ]	B

**Ewer and Pick's Acid**

*See*, Naphthalene-1:6-disulfonic Acid

**F Acid**

*See*, 2-Naphthol-7-sulfonic Acid

*See*, 2-Naphthylamine-7-sulfonic Acid

2-Naphthylamine-3:7-disulfonic Acid (*not considered herein*)

2-Amino-7-naphthol-3-sulfonic Acid (*not considered herein*)

2:7-Dihydroxy-naphthalene-3-sulfonic Acid (*not considered herein*)

**Formaniline**

*See*, Anhydro-formaldehyde-aniline

**4-Formyl-*m*-benzene-disulfonic Acid** (*C. A. nomen.*)

*See*, Benzaldehyde-disulfonic Acid

***o*-Formyl-benzene-sulfonic Acid** (*C. A. nomen.*)

*See*, Benzaldehyde-*o*-sulfonic Acid

**4-Formyl-6-methyl-*m*-benzene-disulfonic Acid**

*See*, 3-methyl-benzaldehyde-4:6-disulfonic Acid

**Forsling's Acid I**

*See*, 2-Naphthylamine-8-sulfonic Acid

**Forsling's Acid II**

*See*, 2-Naphthylamine-5-sulfonic Acid

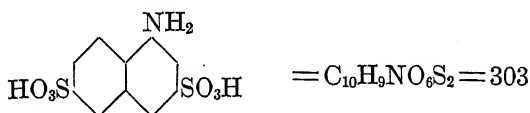
**Freund's Acid**

1-Naphthylamine-3:6-disulfonic Acid

4-Amino-2:7-naphthalene-disulfonic Acid (*C. A. nomen.*)

$\alpha$ -Naphthylamine- $\alpha$ -disulfonic Acid

Alén's  $\alpha$  Acid



STATISTICS.—Imported '14:—5,246 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

FORMATION.—Naphthalene is heated with five parts of concentrated sulfuric acid for about 8 hours at 160–200°, the mixture is cooled and two parts of 50 per cent nitric acid are added. After reacting for some time the nitration mass is diluted and reduced with iron

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 195

Thorpe, *Dic. Chemistry*, 3, 592

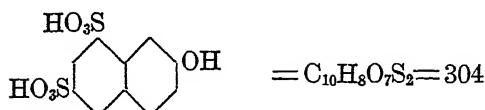
Lange, *Zwischenprodukte*, #2591

**Dyes Derived from Freund's Acid**

<i>Schultz Number Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
266	DISAZO DYES Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	$\alpha$ -Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	$\alpha$ -Naphthylamine Diphenyl- <i>m</i> -phenylene-diamine	A

**G Acid<sup>1</sup>**2-Naphthol-6:8-disulfonic Acid (*C. A. nomen.*) $\beta$ -Naphthol- $\beta$ -disulfonic Acid $\beta$ -Naphthol- $\gamma$ -disulfonic Acid $\beta$ -Naphthol-disulfonic Acid G $\beta$ -Naphthol-disulfonic Acid  $\gamma$ 

Y Acid



STATISTICS.—Imported 14':—11,624 lbs.

Manufactured '18:— ?

Manufactured '19:—732,192 lbs.

Manufactured '20:—1,446,605 lbs.

FORMATION.—Sulfonation of  $\beta$ -naphthol and separation from the R acid simultaneously formedLITERATURE.—Cain, *Intermediate Products* (2d Ed.), 227Thorpe, *Dic. Chemistry*, 3, 627Lange, *Zwischenprodukte*, #2659-2661**Dyes Derived from G Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
38	MONOAZO DYES Orange G	I '14:— 48,456 M '17:— ? M '18:— ? M '19:— ? I '20:— 100 M '20:—120,874	Aniline	A

<sup>1</sup> Occasionally in the old literature G acid is used to mean Gamma acid (or 2-Amino-8-naphthol-6-sulfonic acid), or 2-Naphthylamine-6:8-disulfonic acid, or 1:7-Dihydroxy-naphthalene-3-sulfonic acid.

Dyes Derived from G Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
113	Crystal Ponceau	I '14:— 628	$\alpha$ -Naphthylamine	A
122	Erica G	I '14:— 2,370 M '18:— ? I '20:— 1,142	Dehydro-thio- <i>m</i> -xyli- dine	D
169	Cochineal Red A	I '14:— 32,645 M '17:— ? M '18:— ? M '19:— 231,519 M '20:— 288,945	Naphthionic Acid	A
	DISAZO DYES			
227	Brilliant Croceine M	I '14:— 125,137 M '17:— ? M '18:— 84,643 M '19:— 157,509 I '20:— 49 M '20:— 129,124	Amino-azo-benzene	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline R Acid	A
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine Phenol [Ethylation]	D
	DIPHENYL-NAPHTHYL- METHANE DYE			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:— 127,764 M '20:— 212,362	Hydrol	A

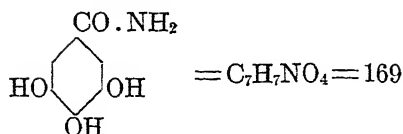
**Gallamic Acid**

*See, Gallamide (C. A. nomen.)*

**Gallamide (C. A. nomen.)**

Gallamic Acid

Gallic Acid Amide



FORMATION.—From tannin by boiling with strong solution of ammonium sulfite and aqueous ammonia until the excess of ammonia has been driven off. The amide crystallizes out upon cooling

LITERATURE.—Green, *Organic Coloring Matters* (1908), 46  
 Lange, *Zwischenprodukte*, #1546

### Dyes Derived from Gallamide

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
627	OXAZINE DYES Modern Cyanine		Nitroso-dimethyl-aniline Dimethyl- <i>p</i> -phenylene- diamine [Reduction]	M
630	Cyanazurine		Nitroso-dimethyl-aniline Aniline [Reduction]	M
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Nitroso-dimethyl-aniline	M
638	Amido Gallamine Blue		Nitroso-dimethyl-aniline [Ammonia, Reduction]	M
641	Coreine RR Coelastine Blue B	I '14:— 1,320 I '20:— 44	Nitroso-diethyl-aniline or Diethylamino-azo- benzene	M
646	Coreine AR		Nitroso-diethyl-aniline or Diethylamino-azo- benzene Aniline [Sulfonation] or [Coreine RR; Aniline; Sulfonation]	M

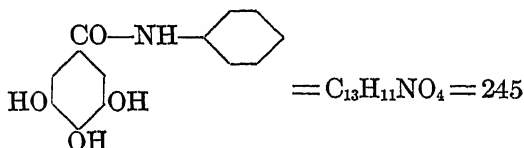
**Gallanilic Acid**

*See, Gallanilide (C. A. nomen.)*

**Gallanilide (C. A. nomen.)**

Gallanilic Acid

Gallic Acid Anilide



STATISTICS.—Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—From tannin by heating with aniline

LITERATURE.—Green, Organic Coloring Matters (1908), 46

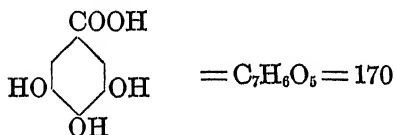
Cf. Lange, Zwischenprodukte, #1546

**Dye Derived from Gallanilide**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
639	OXAZINE DYE Gallanilic Violet R, B		Nitroso-dimethyl-(or diethyl-) aniline	M

**Gallic Acid**

3: 4: 5-Trihydroxy-benzoic Acid



STATISTICS.—Imported '14:—61,644 lbs.

Manufactured regularly, but in amounts that are not  
yearly disclosed

FORMATION.—From nut galls (Chinese or Aleppo) by action of ferments or acids, and subsequent extraction and crystallization

LITERATURE.—Green, *Organic Coloring Matters* (1908), 46  
Lange, *Zwischenprodukte*, #1112

### Dyes Derived from Gallic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
599	XANTHONE DYES Galleine	I '14:— 15,404	Phthalic Anhydride Gallic Acid (2 mols)	M
		M '19:— ?		
		I '20:— 5,075		
		M '20:— ?		
601	Coeruleine S	I '14:— 3,404	Phthalic Anhydride Gallic Acid (2 mols) [Dehydration] <i>or</i> [Galleine dehydrated]	M
		M '19:— ?		
		I '20:— 9,392		
622	OXAZINE DYES Delphine Blue B	M '17:— ?	Nitroso-dimethylaniline Aniline [Sulfonation] <i>or</i> [Gallocyanine, Aniline, Sulfonation]	M
		M '18:— ?		
		M '19:— 43,827		
		I '20:— 29,643		
		M '20:— 76,719		
624	Modern Violet N	I '20:— 5,688	Nitroso-dimethylaniline	M
			[CO <sub>2</sub> split off]	
			<i>or</i> [Gallocyanine heated]	
625	Chrome Heliotrope		Nitroso-methyl-aniline [Reduction]	M
626	Gallocyanine	I '14:— 78,253	Nitroso-dimethylaniline	M
		M '17:— ?		
		M '18:— 435,460		
		M '19:— 365,243		
		I '20:— 12,414		
		M '20:— 70,169		



Dyes Derived from Gallic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	OXAZINE DYES ( <i>continued</i> )			
628	Gallocyanine MS	I '20:— 22	Dimethylamino-azo- benzene-disulfonic Acid  or Nitroso-dimethyl- aniline [Sulfonation; Oxidation]	M
629	Gallogreen DH Modern Blue		Nitroso-dimethyl- aniline [Formaldehyde, Reduc- tion]  or [Gallocyanine, Formal- dehyde, Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,287 M '20:— ?	Nitroso-dimethyl- aniline [Sulfonation]  or [Gallocyanine, Sulfites]	M
632	Ultra Violet LGP	I '14:— 4,368	Nitroso-dimethyl- aniline (2 mols) Gallic Acid (2 mols)	M
633	Indalizarine R	I '20:— 551	Nitroso-dimethyl- aniline [Sulfonation]	M
634	Indalizarine Green		Nitroso-dimethyl- aniline [Sulfonation; Nitration]  or [Indalizarine nitrated]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Nitroso-dimethyl- aniline [Reduction]	M

Dyes Derived from Gallic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
642	OXAZINE DYES ( <i>continued</i> ) Phenocyanine TC	I '20:— 4,740	Nitroso-dimethyl- aniline Resorcinol <i>or</i> [Gallocyanine, Resorci- nol]	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Nitroso-dimethyl- aniline Resorcinol [Sulfonation] <i>or</i> [Phenocyanine sulfo- nated]	M
644	Ultracyanine B		Nitroso-dimethyl- aniline Resorcinol [Alkaline Condensation] <i>or</i> [Gallocyanine; Resorci- nol; Alkaline Con- densation]	M
645	Gallazine A		Nitroso-dimethyl- aniline Schaeffer's Acid [Oxidation] <i>or</i> [Gallocyanine, Schaeffer's Acid Oxidation]	M
664	THIAZINE DYE Leuco-gallo Thionine DH		Dimethyl- <i>p</i> -phenylene- diamine-thiosulfonic Acid	M

Dyes Derived from Gallic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
772	Galloflavine W	I '14:— [838 I '20:— 24	Gallic Acid (2 mols)	M
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Benzoic Acid or Phthalic Anhydride	M

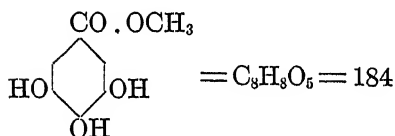
**Gallic Acid Amide**

*See, Gallamide (C. A. nomen.)*

**Gallic Acid Anilide**

*See, Gallanilide (C. A. nomen.)*

**Gallic Acid Methyl Ester**



FORMATION.—From gallic acid by heating with methanol (methyl alcohol) and hydrochloric acid

LITERATURE.—Green, *Organic Coloring Matters* (1908), 46

## Dyes Derived from Gallic Acid Methyl Ester

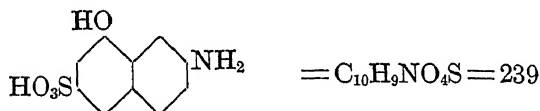
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
636	OXAZINE DYES Prune	I '14:— 3,197 I '20:— 4,418	Nitroso-dimethyl-aniline	M
640	Modern Azurine DH		Nitroso-dimethyl-aniline Aniline	M

## Gamma Acid

2-Amino-8-naphthol-6-sulfonic Acid

Amino-naphthol-sulfonic Acid  $\gamma$ 

Amino-naphthol-sulfonic Acid G

G Acid (*occasionally in old literature*)7-Amino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '18:— ?

Manufactured '19:—155,025 lbs.

Manufactured '20:—418,456 lbs.

FORMATION.— $\beta$ -Naphthol is sulfonated to R and G acids, and these two  $\beta$ -naphthol-disulfonic acids are separated. The sodium salt of G acid is heated in an autoclave with ammonia and sodium bisulfite solution to form amino-G acid (2-naphthylamine-6:8-disulfonic acid). This latter is fused in an autoclave with caustic soda, thus forming gamma acid.

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 236Lange, *Zwischenprodukte*, #2546

Dyes Derived from Gamma Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES			
241	Neutral Gray G	I '14:— 2,546 M '19:— ? I '20:— 3,472 M '20:— ?	Aniline <i>α</i> -Naphthylamin	D
245	Nyanza Black B		<i>p</i> -Nitro-aniline <i>α</i> -Naphthylamine [ <i>p</i> -Nitro-aniline reduced after coupling]	D
274	Diaminogene BB	I '14:—313,629 I '20:— 18,120	Acetyl-1:4-naphthyl- ene-diamine-6-sul- fonic Acid <i>α</i> -Naphthylamin	D
295	Diphenyl Fast Black	I '14:— 882	<i>p</i> : <i>p</i> '-Diamino-ditolyl- amine <i>m</i> -Tolylene-diamine	D
297	Benzo Fast Pink 2BL	I '14:— 3,252 I '20:— 1,226	Diamino-diphenyl-urea- disulfonic Acid Gamma Acid (2 mols)	D
327	Diamine Violet N	I '14:— 18,263 M '19:— ? M '20:— 92,503	Benzidine Gamma Acid (2 mols)	D
328	Diamine Black RO Dianol Black RW	I '14:— 8,253	Benzidine Gamma Acid (2 mols)	D
329	Diamine Brown V	M '19:— ?	Benzidine <i>m</i> -Phenylene-diamine	D
330	Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine 2:7-Naphthylene-dia- mine-sulfonic Acid	D
331	Alkali Dark Brown GV		Benzidine Nitroso- <i>β</i> -naphthol	D
332	Dianil Garnet B Benzo Fast Red	I '14:— 5,985 I '20:— 3,799	Benzidine Amino-R Acid	D

Dyes Derived from Gamma Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
333	Diamine Black BH Oxamine Black BHN	I '14:—619,430 M '17:— ? M '18:— ? M '19:—485,046 I '20:— 5,512 M '20:—803,501	Benzidine H Acid	D
335	Naphthamine Black RE	I '14:— 49,016	Benzidine K Acid	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:—115,865	Benzidine Salicylic Acid	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:—257,872	Benzidine Salicylic Acid	D
399	Indazurine TS		Tolidin 1: 7-Dihydroxy-2-naph- thoic-4-sulfonic Acid	D
402	Diamine Blue Black E		Ethoxy-benzidine 2-Naphthol-3: 7-disul- fonic Acid	D
403	Diamine Black BO		Ethoxy-benzidine Gamma Acid (2 mols)	D
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- and 7-sulfonic Acids <i>m</i> -Phenylene-diamine <i>p</i> -Phenylene-diamine	D
437	Iso-Diphenyl Black R		Resorcinol <i>p</i> -Phenylene-diamine <i>m</i> -Phenylene-diamine	D

Dyes Derived from Gamma Acid (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
440	Direct Indigo Blue BK		Benzidine <i>m</i> -Amino- <i>p</i> -cresol Methyl Ether Gamma Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid $\alpha$ -Naphthylamine	D
444	Crumpsall Direct Fast Brown B		Benzidine Salicylic Acid Aniline	D
461	Coomassie Union Blacks		1: 4-Naphthylene-dia- mine-2-sulfonic Acid <i>m</i> -Phenylene-(or Toly- lene-) diamine or Resorcinol (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline H Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine <i>p</i> -Nitro-aniline H Acid	D
491	TETRAKISAZO DYE Dianil Black PR		Benzidine sulfonic Acid Gamma Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D

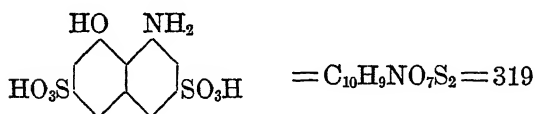
G R Acid

See, 1-Naphthol-3: 6-disulfonic Acid

**H Acid**

1-Amino-8-naphthol-3:6-disulfonic Acid

Amino-naphthol-disulfonic Acid H

8-Amino-1-naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

STATISTICS.—Imported '14:— 96,296 lbs.

Manufactured '17:—3,089,273 lbs.

Manufactured '18:—3,837,534 lbs.

Manufactured '19:—2,883,228 lbs.

Manufactured '20:—5,180,993 lbs.

FORMATION.—Naphthalene is trisulfonated with oleum, and then nitrated and reduced with iron, resulting in the formation of Koch acid or 1-naphthylamine-3:6:8-trisulfonic acid. This latter is now fused in an autoclave with caustic soda, forming H acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 237Lange, *Zwischenprodukte*, #2720–2724Thorpe, *Dic. Chemistry*, 3, 641**Dyes Derived from H Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
41	MONOAZO DYES Fast Acid Fuchsine B	M '18:— ? M '19:— 26,699 M '20:— 30,678	Aniline	A
182	Fast Sulfon Violet 5BS Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	Aniline Benzene-(or Toluene-) sulfo chloride	A
186	Lanacyl Violet B	I '14:— 3,628 M '17:— ? M '18:— ?	Ethyl- $\alpha$ -naphthylamine	A



Dyes Derived from H Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
187	Lanacyl Blue BB	I '14:— 4,200	5-Amino-1-naphthol	A
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:— 454,185	Phenyl-1-naphthyl- amine-8-sulfonic Acid	A
189	Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	Tolyl-1-naphthylamine- 8-sulfonic Acid	A
	DISAZO DYES			
217	Naphthol Blue Black Agalma Black 10B	I '14:— 431,027 M '17:— 620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	p-Nitro-aniline Aniline	A
261	Buffalo Black 10B	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid α-Naphthylamine	A
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid β-Naphthol	A
333	Diamine Black BH Oxamine Black BHN	I '14:— 619,430 M '17:— ? M '18:— ? M '19:— 485,046 I '20:— 5,512 M '20:— 803,501	Benzidine Gamma Acid	D

Dyes Derived from H Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
334	Diphenyl Blue Black	I '14:— 26,240	Benzidine Ethyl-gamma Acid	D
336	Benzo Cyanine R	I '14:— 201	Benzidine 1-Amino-8-naphthol-4- sulfonic Acid	D
337	Diamine Blue 2B Benzo Blue 2B	I '14:— 19,035 M '17:— 1,445,059 M '18:— 1,523,985 M '19:— 1,380,335 M '20:— 1,789,774	Benzidine H Acid (2 mols)	D
353	Direct Indigo Blue BN	I '14:— 6,000	Benzidine 1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid	D
381	Azo Black Blue B, R		Tolidine <i>m</i> -Hydroxy-diphenyl- amine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	$\alpha$ -Naphthylamine Tolidine	D
383	Naphthazurine B	I '14:— 4,782	Tolidine $\beta$ -Naphthylamine	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine Nevile-Winther's Acid	D
390	Benzo Cyanine B	I '14:— 201	Tolidine 1-Amino-8-naphthol-4- sulfonic Acid	D

Dyes Derived from H Acid (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
391	Diamine Blue 3B Benzo Blue 3B	I '14:— 1,365 M '17:— 14,533 M '18:— 99,645 M '19:—182,946 I '20:— 1,124 M '20:—136,891	Tolidine H Acid (2 mols)	D
425	Benzo Cyanine 3B	I '14:— 1,001	Dianisidine 1-Amino-8-naphthol-4- sulfonic Acid	D
426	Diamine Pure Blue Benzamine Pure Blue	I '14:— 12,881 M '17:— ? M '18:— ? M '19:—192,350 I '20:— 662 M '20:—223,100	Dianisidine H Acid (2 mols)	D
430	Indazurine 5 GM		Dianisidine 1:7-Dihydroxy-2-naph- thoic-4-sulfonic Acid	D
	TRISAZO DYES			
438	Mclogene Blue BH	M '17:— ? M '18:— ?	Benzidine <i>p</i> -Xylidine H Acid (2 mols)	D
439	Direct Indigo Blue A	M '18:— ?	H Acid (2 mols) Benzidine <i>m</i> -Amino- <i>p</i> -cresol Methyl Ether	D
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	Benzidine $\alpha$ -Naphthylamine H Acid (2 mols)	D
443	Direct Indone Blue R		Benzidine $\alpha$ -Naphthylamine 2 R Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine Salicylic Acid $\alpha$ -Naphthylamine	D

## Dyes Derived from H Acid (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
448	Diamine Bronze G	I '14:— 4,495	Benzidine Salicylic Acid <i>m</i> -Phenylene-diamine	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline <i>m</i> -Phenylene-diamine	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline <i>m</i> -Tolylene-diamine	D
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine Aniline Phenol	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine <i>o</i> -Chloro- <i>p</i> -nitro-aniline Phenol	D
468	Diphenyl Green 3G		Benzidine <i>o</i> -Chloro- <i>p</i> -nitro-aniline Salicylic Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763	Benzidine 2: 5-Dichloro-aniline <i>m</i> -Phenylene-diamine	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine 2: 5-Dichloro-aniline Phenol	D

## Dyes Derived from H Acid (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	TRISAZO DYES (continued)			
471	Chloramine Blue 3G	I '14:— 286 M '19:— ? I '20:— 882	Benzidine 2: 5-Dichloro-aniline H Acid (2 mols)	D
472	Chloramine Blue HW		Benzidine 2: 5-Dichloro-aniline Gamma Acid	D
473	Diamine Black HW	I '20:— 342	Benzidine <i>p</i> -Nitro-aniline Gamma Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:— 295,147 M '19:— 305,854 I '20:— 2,460 M '20:— 420,138	Benzidine <i>p</i> -Nitro-aniline Phenol	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:— 136,638 I '20:— 1,332 M '20:— 53,292	Benzidine <i>p</i> -Nitro-aniline Salicylic Acid	D

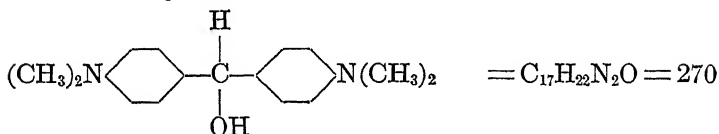
**Histazarin**2: 3-Dihydroxy-anthraquinone (*not considered herein*)***o*-Homo-salicylic Acid***See, o*-Cresotic Acid***p*-Hydrazine-benzene-sulfonic Acid (C. A. nomen.)***See, Phenyl-hydrazine-p*-sulfonic Acid **$\alpha$ -Hydro-juglone**1: 4: 5-Trihydroxy-naphthalene (*not considered herein*)

**Hydrol**

Tetramethyl-diamino-benzohydrol

*p*: *p*'-Bis(dimethylamino)-benzohydrol (*C. A. nomen.*)

Michler's Hydrol



STATISTICS.—Manufactured '20:—88,583 lbs.

FORMATION.—Dimethyl-aniline is condensed with formaldehyde in presence of hydrochloric acid, and the resulting product is oxidized with lead peroxide; or the corresponding ketone (tetramethyl-diamino-benzophenone) is reduced with zinc

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 102-3  
 Lange, *Zwischenprodukte*, #1358

**Dyes Derived from Hydrol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
498	Turquoise Blue	I '14:— 1,541 I '20:— 1,407	<i>p</i> -Nitro-toluene [Oxidation]	B
509	Chrome Green		Benzoic Acid [Oxidation]	M
516	Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline [Oxidation]	B
528	Fast Acid Violet 10B	I '14:— 12,919 M '17:— ? M '18:— ? M '19:— ? I '20:— 10,086 M '20:— ?	Benzyl-ethyl(methyl)-aniline-disulfonic Acid [Oxidation]	A

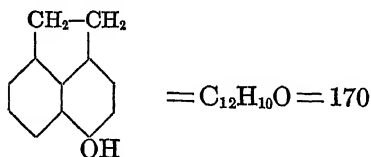
Dyes Derived from Hydrol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Applica- tion Class</i>
	TRISAZO DYES ( <i>continued</i> )			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3: 5-dinitro- benzene-sulfonic Acid Metanilic Acid or Dinitro-diphenylamine- disulfonic Acid	A
549	Chrome Violet	I '14:— 51	Salicylic Acid [Oxidation]	M
550	Chrome Bordeaux		Amino-salicylic Acid [Oxidation]	M
	DIPHENYL-NAPHTHYL- METHANE DYES			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl- $\alpha$ -naphthylamine [Oxidation]	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 4,171 M '20:— ?	Phenyl- $\alpha$ -naphthyl- amine [Oxidation]	B
562	Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	1-Naphththylamine-2- sulfonic Acid [Oxidation]	A
563	New Patent Blue B	I '14:— 595 I '20:— 1,814	Naphthionic Acid or Laurent's Acid [Substitution of -NH <sub>2</sub> by -SO <sub>3</sub> Na and Oxida- tion]	A
564	Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Naphthalene or Naphthalene-2: 7-disul- fonic Acid	A

Dyes Derived from Hydrol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DIPHENYL-NAPHTHYL- METHANE DYES ( <i>continued</i> )			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	G Acid	A
567	Chrome Blue		1-Hydroxy-2-naphthoic Acid [Oxidation]	M
652	OXAZINE DYE New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl- aniline $\beta$ -Naphthol or [Meldola's Blue]	B

## 3-Hydroxy-acenaphthene

4-Hydroxy-acenaphthene (*German numbering*)3-Acenaphthenol (*C. A. nomen.*)

FORMATION.—From 3-amino-acenaphthene by diazotizing and then boiling to hydrolyze the diazo group

LITERATURE.—Lange, *Zwischenprodukte*, #2957  
Frdl. 10, 544

## Dye Derived from 3-Hydroxy-acenaphthene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
894	INDIGO GROUP DYES Alizarin Indigo B	I '14:— 402 I '20:— 291	2-Isatin Anilide	V



**4-Hydroxy-acenaphthene** (*German numbering*)

*See*, 3-Hydroxy-acenaphthene

**1-Hydroxy-anthracene**

*See*, 1-Anthrol (*C. A. nomen.*)

**9-Hydroxy-anthracene**

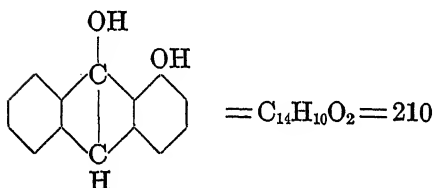
*See*, 9-Anthrol (*C. A. nomen.*)

**1-Hydroxy-anthranol**

1-Hydroxy-9-anthrol

$\alpha$ -Hydroxy-anthranol

1: 9-Anthradiol (*C. A. nomen.*)



FORMATION.—1-Hydroxy-anthraquinone is reduced with hydrosulfite and alkali or with stannous chloride and hydrochloric acid

LITERATURE.—Ger. Pat. 242,053; Frdl. 10, 532

Barnett, Anthracene and Anthraquinone

**Dye Derived from 1-Hydroxy-anthranol**

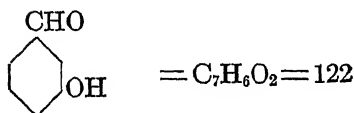
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
896	INDIGO GROUP DYES Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	2-Isatin Anilide	V

**$\alpha$ -Hydroxy-anthranol**

*See*, 1-Hydroxy-anthranol

**1-Hydroxy-9-anthrol**

*See*, 1-Hydroxy-anthranol

***m*-Hydroxy-benzaldehyde**

FORMATION.—From *m*-amino-benzaldehyde by diazotizing the amino-group and then boiling until the nitrogen evolution ceases

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 145

Lange, *Zwischenprodukte*, #461

**Dyes Derived from *m*-Hydroxy-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) [Sulfonation, Oxidation] or [Oxidation of Patent Blue]	A
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
546	Cyanol	I '14:— 40,015 I '20:— 7,954	Ethyl- <i>o</i> -toluidine (2 mols) [Sulfonation, Oxidation]	A

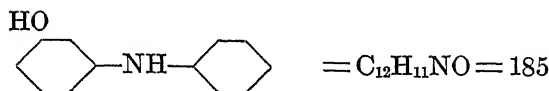
***m*-Hydroxy-dimethyl-aniline**

See, *m*-Dimethylamino-phenol (*C. A. nomen.*)

***m*-Hydroxy-diphenylamine**

Phenyl-*m*-amino-phenol

*m*-Anilino-phenol (*C. A. nomen.*)



FORMATION.—(1) From resorcinol by heating with aniline and zinc chloride at 280–290°. (2) From *m*-amino-phenol by heating with aniline hydrochloride in an autoclave at 210–215°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 55  
 Lange, *Zwischenprodukte*, #1613

**Dyes Derived from *m*-Hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
381	DISAZO DYE Azo Black Blue B, R		Tolidine H Acid	D
658	OXAZINE DYE Fast Black	I '14:— 1,960 I '20:— 2,883	Nitroso-dimethyl-aniline	B

***N*-(3-Hydroxy-4-keto-1(4)-naphthylidene)-sulfanilic Acid (*C. A. nomen.*)**

*See, β*-Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid

**1-Hydroxy-naphthalene-2-carboxylic Acid**

*See, 1*-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

**2-Hydroxy-naphthalene-3-carboxylic Acid**

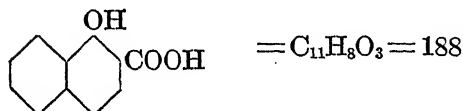
*See, 3*-Hydroxy-2-naphthoic Acid (*C. A. nomen.*)

**Hydroxy-naphthalene-sulfonic Acids**

*See, Naphthol-sulfonic Acids*

**1-Hydroxy-2-naphthoic Acid** (*C. A. nomen.*)

1-Hydroxy-naphthalene-2-carboxylic Acid

 $\alpha$ -Oxy-naphthoic Acid $\alpha$ -Naphthol-carboxylic Acid

**FORMATION.**— $\alpha$ -Naphthol is converted into sodium  $\alpha$ -naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 120–145°

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 240  
Lange, *Zwischenprodukte*, #775, 2308

**Dye Derived from 1-Hydroxy-2-naphthoic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
567	DIPHENYL-NAPHTHYL-METHANE DYES Chrome Blue		Hydrol [Oxidation]	M

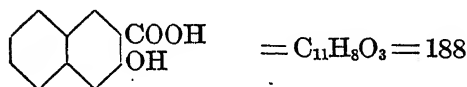
**2-Hydroxy-3-naphthoic Acid**

*See, 3-Hydroxy-2-naphthoic Acid (C. A. nomen.)*

**3-Hydroxy-2-naphthoic Acid** (*C. A. nomen.*)

2-Hydroxy-3-naphthoic Acid

2-Hydroxy-naphthalene-3-carboxylic Acid

 $\beta$ -Oxy-naphthoic Acid $\beta$ -Naphthol-carboxylic Acid

STATISTICS.—Imports '14:—2,359 lbs.

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.— $\beta$ -Naphthol is converted into the sodium  $\beta$ -naphtholate, and treated with the theoretical amount of carbon dioxide under pressure and at 200–250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 241

Lange, Zwischenprodukte, #775, 2308

**Dyes Derived from 3-Hydroxy-2-naphthoic Acid**

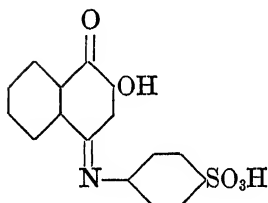
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
45	MONOAZO DYES Brilliant Lake Red R	I '14:— 31,674 I '20:— 1,071	Aniline	CL
152	Lithol Rubine B Permanent Red 4B	I '14:—101,395 M '19:— ? I '20:— 2,983 M '20:— ?	<i>p</i> -Toluidine- <i>o</i> -sulfonic Acid	CL
179	Lake Bordeaux B		2-Naphthylamine-1-sul- fonic Acid	CL

**$\beta$ -Hydroxy-naphthoquinone**

1: 2-Dihydroxy-naphthalene (*not considered herein*)

**$\beta$ -Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid**

*N*-(3-Hydroxy-4-keto-1(4)-naphthylidene)-sulfanilic Acid (*C. A. nomen.*)



FORMATION.—The potassium salt of 1:2-naphthoquinone-4-sulfonic acid is condensed with the sodium salt of sulfanilic acid, splitting off a sulfonic group and furnishing the  $\beta$ -hydroxy-naphthoquinonyl-aniline-*p*-sulfonic acid

LITERATURE.—Lange, Schwefelfarbstoffe, 393,139

Lange, Zwischenprodukte, #2870, 2871

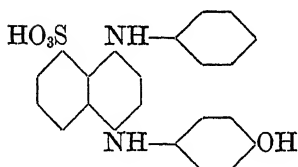
Schultz, Farbstofftabellen, #747

**Dye Derived from  $\beta$ -Hydroxy-naphthoquinonyl-aniline-*p*-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
747	SULFUR DYE Thional Brown G	I '14:— 110 I '20:— 43,219	[S+Na <sub>2</sub> S]	S

**4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid**

8-Anilino-5-(*p*-hydroxy-anilino)-1-naphthalene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—By condensation of phenyl-1-naphthylamine-8-sulfonic acid and *p*-amino-phenol

LITERATURE.—Lange, Schwefelfarbstoffe, 425

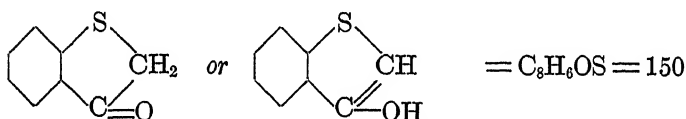
**Dye Derived from 4-(*p*-Hydroxy-phenyl-amino)-1-phenylamino-naphthalene-8-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
746	SULFUR DYE Thional Green B Katigene Green	I '14:— 63,929 I '20:— 14,370	[Na <sub>2</sub> S+S]	S

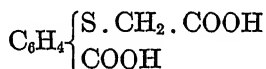
**2-Hydroxy-thionaphthene** (*C. A. and English nomen.*)

3-Hydroxy-1-thionaphthene (*German numbering*)

Thioindoxyl



**FORMATION.**—Thiosalicylic acid with chloro-acetic acid gives phenyl thioglycolic-*o*-carboxylic acid:



This body, by heating with a little water and caustic soda, closes up the second ring and forms 2-hydroxy-thionaphthene-1-carboxylic acid, which in warm acid solution decomposes, losing CO<sub>2</sub> and forming 2-hydroxy-thionaphthene

**LITERATURE.**—Lange, *Zwischenprodukte*, #2148–2163

Georgievics and Grandmougin, *Dye Chemistry*, 432–434

Schultz, *Farbstofftabellen* (5 auf.), #912

Cain, *Intermediate Products* (2d Ed.), 159

## Dyes Derived from 2-Hydroxy-thionaphthene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
899	INDIGO GROUP DYES Ciba Gray G	I '14:— 675	2-Isatin anilide [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Isatin anilide [Bromination]	V
900	Thio Indigo Violet K		2-Isatin anilide [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Isatin anilide [Bromination]	V
905	Thio Indigo Scarlet R	I '20:— 270	Isatin	V
906	Thio Indigo Scarlet G	I '20:— 1,291	Isatin [Bromination]	V
907	Ciba Scarlet G	I '14:— 22,265 I '20:— 25,578	Acenaphthenequinone	V
908	Ciba Red R	I '14:— 1,001	Acenaphthenequinone [Bromination]	V
912	Thio Indigo Red B	I '14:— 1,102 I '20:— 275	2-Hydroxy-thionaph- thene (2 mols)	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	2-Hydroxy-thionaph- thene (2 mols) [Bromination] or [Bromination of Thio Indigo Red R]	V

## 3-Hydroxy-thionaphthene

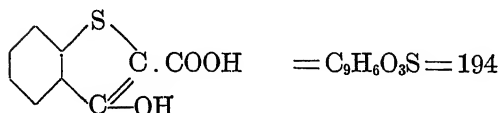
See, 2-Hydroxy-thionaphthene



**2-Hydroxy-thionaphthene-1-carboxylic Acid** (*C. A. nomen.*)

3-Hydroxy-(1)-thionaphthene-2-carboxylic Acid (*German numbering*)

Thioindoxyl-carboxylic Acid



FORMATION.—From phenyl-thioglycol-*o*-carboxylic acid through closing of the side chain upon fusion with caustic soda. (The carboxylic group is very easily split off with the formation of 2-hydroxy-thionaphthene.) Cf. 2-hydroxy-thionaphthene

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 159  
Lange, *Zwischenprodukte*, #2148–2163

USES.—See 2-hydroxy-thionaphthene

**I Acid**

See, J Acid

***p*: *p*'-Imino-bisaniline** (*C. A. nomen.*)

See, *p*: *p*'-Diamino-diphenylamine

**4: 4'-Imino-bis-*o*-toluidine** (*C. A. nomen. N H<sub>2</sub> = 1*)

See, *p*: *p*'-Diamino-ditolyl-amine

**Indanthrene**

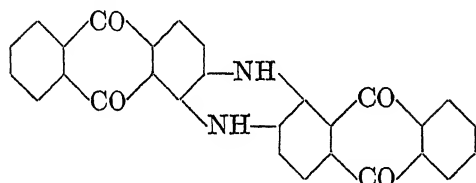
See, Indanthrone

**Indanthrene-sulfonic Acid**

See, Indanthrone-sulfonic Acid

**Indanthrone**

Dianthraquinone-dihydroazine

Indanthrene (*C. A. nomen.*)

**FORMATION.**—Anthraquinone is sulfonated with oleum to 2-anthraquinone-sulfonic acid, which upon being heated in an autoclave with ammonia forms 2-amino-anthraquinone. This latter by the action of alkali at 200–300° is converted to indanthrone

**LITERATURE.**—Georgievics and Grandmougin, *Dye Chemistry*, 449–450  
 Barnett, *Anthracene and Anthraquinone*, 342  
 Schultz, *Farbstofftabellen* (1914 Ed.), #837

**Dyes Derived from Indanthrone**

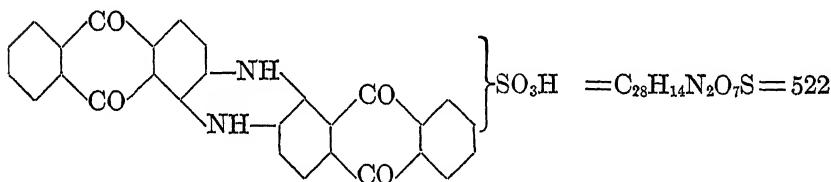
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
837	Indanthrene Blue R	I '14:— 500	[This is indanthrone]	V
838	Indanthrene Blue RS	I '14:—187,379 M '17:— ? I '20:— 16,385 M '20:— ?	[Reduction]	V
840	Indanthrene Blue	I '14:— 6,120 I '20:— 551	[Oxidation]	V
841	Indanthrene Blue 2GS	I '14:— 10,163 I '20:— 500	[?]	V
842	Indanthrene Blue GCD	I '14:—478,980 M '19:— ? I '20:—147,620	[Dichlorination]	V

Dyes Derived from Indanthrone (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
843	Indanthrene Blue GC	I '14:— 1,499 I '20:— 4,700	[Dibromination]	V
850	Indanthrene Blue WB	I '14:— 32,957 I '20:— 2,998	[?]	V

Indanthrone-sulfonic Acid

Indanthrene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—(1) From 2-amino-anthraquinone-sulfonic acid by fusion with caustic alkali at 200–300° C. (2) By sulfonating indanthrone (obtained by alkaline fusion of 2-amino-anthraquinone)

LITERATURE.—Barnett, Anthracene and Anthraquinone, 352  
Thorpe, *Dic. Chemistry*, 3, 101 *et seq.*

Dye Derived from Indanthrone-sulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	ANTHRAQUINONE AND ALLIED DYES			
840	Indanthrene Blue	I '14:— 6,120 I '20:— 1,702		V

**Indigo :**

*Note.*—Indigo is of course a dye and not an intermediate. However because of their close mutual connection, it was considered worth while to list together the dyes derived directly from indigo. All of these dyes are also classified by the various intermediates that are used for the manufacture of indigo, namely:—

1. Phenyl-glycine (2 mols)
2. Phenyl-glycine-o-carboxylic Acid (2 mols)
3. Thiocarbanilide (2 mols)
4. Aniline (2 mols)
5. Phthalic anhydride (2 mols)

**Dyes Derived from Indigo**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
874	INDIGO GROUP DYES Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231		V
876	Indigo MLB Indigo White		[Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	[Sulfonation]	A
878	Indigotine P		[Sulfonation]	A

Dyes Derived from Indigo (*continued*)

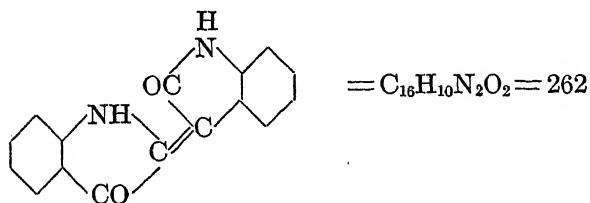
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
879	Brom Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	[Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	[Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	[Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	[Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	[Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	[Chlorination, Bromina- tion]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	[Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	[Chlorination, Bromina- tion]	V
889	Indigo Yellow 3G		Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Benzoyl Chloride [Bromination]	V

Indigo Red

*See, Indirubin*

**Indirubin** (*C. A. nomen.*)Oxindole- $[\Delta^{3,2'}]$ -pseudoindoxyl

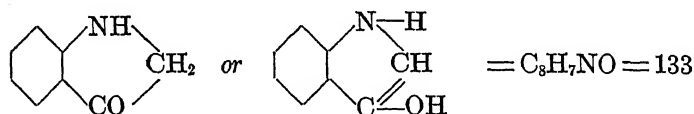
Indigo Red

**FORMATION.**—By reaction of indoxyl on isatin in the “indoxyl melt”**LITERATURE.**—Georgievics and Grandmougin, *Dye Chemistry*, 410  
Ger. Pat. 192,682; *Frdl.* 9, 533**Dye Derived from Indirubin**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
897	INDIGO GROUP DYES Ciba Heliotrope B		[Bromination]	V

**Indoxyl** (*C. A. nomen.*)

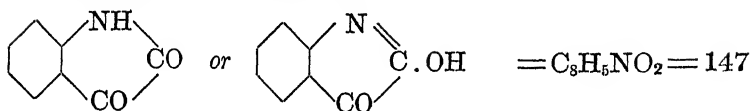
3-Hydroxy-indole

**FORMATION.**—From phenyl-glycine by fusion with sodamide**LITERATURE.**—Lange, *Zwischenprodukte*, #2057-2084**Dye Derived from Indoxyl**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
897	INDIGO GROUP DYES Ciba Heliotrope B		Isatin [Bromination]	V

**Isatin** (*C. A. nomen.*)

**2-Hydroxy-3-pseudoindolone**



STATISTICS.—Imported '14:—very small  
 Manufactured '20:— ?

FORMATION.—From indoxyl by oxidation

LITERATURE.—Lange, Zwischenprodukte, #1815, 2023, 2110–2116

**Dyes Derived from Isatin**

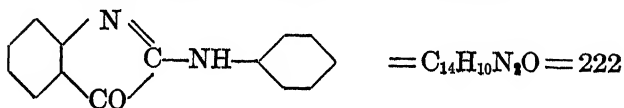
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
897	INDIGO GROUP DYES Ciba Heliotrope B		Indoxyl [Bromination]	V
898	Helindone Violet D		7-Methyl-indoxyl [Bromination]	V
904	Helindone Brown G	I '14:— 13,086 I '20:— 2,200	5-Amino-2-hydroxy- thionaphthene [Bromination]	V
905	Thio Indigo Scarlet R	I '20:— 370	2-Hydroxy-thionaph- thene	V
906	Thio Indigo Scarlet G	I '20:— 1,291	2-Hydroxy-thionaph- thene [Bromination]	V

**2-Isatin Anilide**

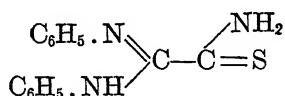
*α*-Isatin Anilide

Isatin-2-phenylimide

**2-Anilino-3-pseudoindolone** (*C. A. nomen.*)



FORMATION.—Aniline is condensed with carbon disulfide to thiocarbani-  
lide  $(C_6H_5 \cdot NH)_2 CS$ , which is treated in solution with potassium  
cyanide and lead carbonate, resulting in the formation of the  
corresponding cyanide. This cyanide is reacted with yellow am-  
monium sulfide (containing  $NH_4 \cdot S \cdot S \cdot NH_4$ ), and a thioamide is  
formed:



This compound upon being heated with sulfuric acid gives a good  
yield of 2-isatin anilide

LITERATURE.—Lange, *Zwischenprodukte*, #2132–2134

Georgievics and Grandmougin, *Dye Chemistry*, 413

#### Dyes Derived from 2-Isatin Anilide

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
894	INDIGO GROUP DYES Alizarin Indigo B	I '14:— 402 I '20:— 291	3-Hydroxy-acenaph- thene	V
896	Helindone Blue 3GN	I '14:— 622 I '20:— 2,527	1-Hydroxy-anthranol	V
899	Ciba Gray G	I '14:— 675	2-Hydroxy-thionaph- thene [Bromination]	V
900	Ciba Violet 3B	I '14:— 2,667	2-Hydroxy-thionaph- thene [Bromination]	V
900	Thioindigo Violet K		2-Hydroxy-thionaph- thene [Bromination]	V
901	Ciba Violet B	I '14:— 20,836 I '20:— 18,287	2-Hydroxy-thionaph- thene [Bromination]	V



Dyes Derived from 2-Isatin Anilide (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
902	Helindone Brown 2R	I '14:— 876 I '20:— 1,778	5-Amino-1-hydroxy-thionaphthene [Bromination]	V
903	Helindone Brown 5R		5-Amino-1-hydroxy-thionaphthene [Bromination]	V

**$\alpha$ -Isatin Anilide**

*See, 2-Isatin Anilide*

**Isatin-2-phenylimide**

*See, 2-Isatin Anilide*

**Isoanthraflavic Acid**

2: 7-Dihydroxy-anthraquinone (*not considered herein*)

**Iso- $\gamma$  Acid**

*See, J Acid*

**Iso-naphthazarin**

2: 3-Dihydroxy-1: 4-naphthoquinone (*not considered herein*)

**Isoquinoline**



STATISTICS.—Imported '14:—very small

FORMATION.—Isoquinoline is extracted from coal-tar or prepared by synthetical means

LITERATURE.—Lange, Zwischenprodukte, #1997

### Dye Derived from Isoquinoline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
610	QUINOLINE DYE Quinoline Red		Benzo-trichloride Quinaldine	B

### J Acid

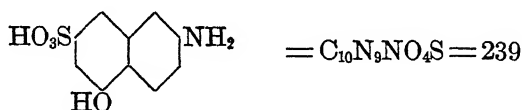
2-Amino-5-naphthol-7-sulfonic Acid

Amino-naphthol-sulfonic Acid J

6-Amino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)

I Acid

Iso-γ Acid



STATISTICS.—Imports '14:—1,153 lbs.

Manufactured '20:— ?

FORMATION.—β-Naphthylamine is disulfonated to a mixture of 2-naphthylamine-5:7-disulfonic acid and 2-naphthylamine-6:8-disulfonic acid. The latter is amino-G acid and is a step in the preparation of gamma acid. The former is fused with caustic soda in an autoclave to form J acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 235

Lange, Zwischenprodukte, #2542

Thorpe, Dic. Chemistry, 3, 640

## Dyes Derived from J Acid

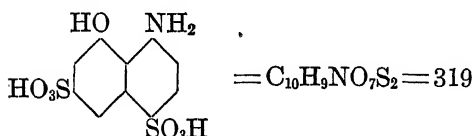
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
279	DISAZO DYES Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Phosgene Aniline or Toluidine or Xylidine or $\beta$ -Naphthylamine or Amino-azo-benzene (2 mols)	D
326	Oxamine Violet Oxy Diamine Violet BF	I '14:— 23,981 I '20:— 732	Benzidine J Acid (2 mols)	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine Salicylic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine Nevile-Winther's Acid	D

## Juglone

5-Hydroxy-1:4-naphthoquinone (*not considered herein*)K Acid<sup>1</sup>

1-Amino-8-naphthol-4:6-disulfonic Acid

Amino-naphthol-disulfonic Acid K

8-Amino-1-naphthol-3:5-disulfonic Acid (*C. A. nomen.*)

<sup>1</sup> K acid is also occasionally used as trivial name for 1:3-Dihydroxy-naphthalene-3:5-disulfonic acid.

FORMATION.—Naphthalene is disulfonated to the 1:5 acid, and then further sulfonated to the 1:3:5-trisulfonic acid. This trisulfonic acid while still in the sulfonation mixture is diluted with a little ice, and cooled, and it is then nitrated cold with the theoretical amount of mixed acid. It is reduced with iron, forming 1-naphthylamine-4:6:8-trisulfonic acid, which upon being fused with caustic soda in an autoclave yields the K acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 239

Lange, *Zwischenprodukte*, #2728

Thorpe, *Dic. Chemistry*, 3, 642

### Dyes Derived from K Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
43	MONOAZO DYE Tolane Red B, G		Aniline	A
215	DISAZO DYES Blue Black N	I '14:— 2,653	Aniline <i>p</i> -Nitro-aniline	A
219	Chrome Patent Green N		Aniline Picramic Acid	ACr
335	Naphthamine Black RE	I '14:— 49,016	Benzidine Gamma Acid	D
338	Naphthamine Blue 2B or 3B	I '14:— 11,707 I '20:— 400	Benzidine or Tolidine K <sub>2</sub> Acid (2 mols)	D

### Kalle's Acid

1-Naphthylamine-2:7-disulfonic Acid (*not considered herein*)

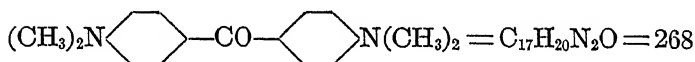
**Ketone**

Tetramethyl-diamino-benzophenone

*p*: *p'*-Bis(dimethylamino)-benzophenone (*C. A. nomen.*)

Michler's Ketone

Ketone Base



STATISTICS.—Imported '14:—small amount

Manufactured '17:— ?

Manufactured '18:— 73,208 lbs.

Manufactured '19:—281,057 lbs.

Manufactured '20:— 90,664 lbs.

FORMATION.—From dimethyl-aniline by reaction with phosgene

LITERATURE.—Cain, Intermediate Products (2d Ed.), 103

Lange, Zwischenprodukte, #1382

**Dyes Derived from Ketone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
493	AURAMINES Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Ammonium chloride and Zinc chloride]	B
516	TRIPHENYL-METHANE DYES Crystal Violet	I '14:— 51,872 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,919 M '20:— ?	Dimethyl-aniline	B
522	Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Methyl-phenyl- $\alpha$ -naphthylamine	B

## Dyes Derived from Ketone (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	TRIPHENYL-METHANE DYES (continued)			
527	Acid Violet 4BN	I '14:— 29,184 I '20:— 23,335	Benzyl-methyl-aniline	A
548	Acid Violet 6BN	I '14:— 6,861 I '20:— 5,582	3-Ethoxy-4'-methyl- diphenylamine [Sulfonation]	A
	DIPHENYL-NAPHTHYL- METHANE DYES			
558	Victoria Blue R	I '14:— 4,171 I '20:— 97	Ethyl- $\alpha$ -naphthylamine	B
559	Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Phenyl- $\alpha$ -naphthyl- amine	B
561	Acid Violet 5BNS	I '14:— 1,896	Methyl-(Ethyl-) phenyl- $\beta$ -naphthylamine	A
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:—127,764 M '20:—212,362	$\beta$ -Naphthol [Sulfonation]	A
607	ACRIDINE DYE Rheonine	I '14:— 19,704	<i>m</i> -Phenylene-diamine	B

**5-Keto-1-(*p*-sulfo-phenyl)-3- $\Delta^2$ -yprazoline-carboxylic Acid** (C. A. nomen.)

*See*, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

**Koch's Acid**

*See*, 1-Naphthylamine-3:6:8-trisulfonic Acid

**L Acid**

See, 1-Naphthol-5-sulfonic Acid (*C. A. nomen.*)

See Laurent's Acid

2: 6-Dihydroxy-naphthalene-3-carboxylic Acid (*not considered herein*)

**Lambda Acid or λ Acid**

See, 1-Naphthylamine-2-sulfonic Acid

**Landschoff and Meyer's Acid**

1-Naphthylamine-2: 5-disulfonic Acid (*not considered here*)

**Laurent's α Acid**

1-Nitro-naphthalene-5-sulfonic Acid (*not considered herein*)

**Laurent's Acid**

1-Naphthylamine-5-sulfonic Acid

α-Naphthylamine-sulfonic Acid L

5-Amino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

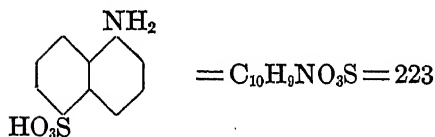
Naphthalidine-sulfonic Acid

Naphthalidinic Acid

Cleve's α Acid

**L Acid**

Laurent's Naphthalidinic Acid



STATISTICS.—Imported '14:— 2,832  
 Manufactured '18:— ?  
 Manufactured '19:— ?  
 Manufactured '20:—294,352

PREPARATION.—(1) From α-naphthylamine by sulfonation with oleum.  
 (2) From α-naphthalene-sulfonic acid by nitration reduction and separation from the 1-naphthylamine-8-sulfonic acid also formed

LITERATURE.—Cain, Intermediate Products (2d Ed.), 190  
 Lange, Zwischenprodukte, #2360-2  
 Thorpe, Dic, Chemistry, 3, 590

## Dyes Derived from Laurent's Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
53	MONOAZO DYE Archil Substitute 3VN		<i>p</i> -Nitro-aniline	A
162	Brilliant Fast Red G		$\beta$ -Naphthol	A
265	DISAZO DYES Sulfonycyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	$\alpha$ -Naphthylamine or 1-Naphthylamine- 6- and 7-sulfonic Acids Phenyl-1-naphthyl- amine-8-sulfonic Acid	A
308	Diazo Black B	I '14:— 62,854	Laurent's Acid (2 mols) Benzidine	D
364	Benzopurpurin 6B	I '14:— 9,171 I '20:— 4,743	Laurent's Acid (2 mols) Tolidine	D
480	TRISAZO DYE Congo Brown R	I '14:— 3,045	Benzidine Resorcinol Salicylic Acid	D
563	DIPHENYL NAPHTHYL- METHANE DYE New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH <sub>2</sub> by SO <sub>3</sub> H; Oxidation]	A

## Laurent's Naphthalidinic Acid

*See, Laurent's Acid (1-Naphthylamine-5-sulfonic Acid)*

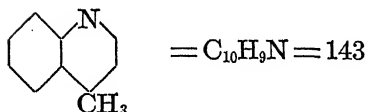


**Lepidine** (*C. A. nomen.*)

4-Methyl-quinoline ( $N=1$ )

$\gamma$ -Methyl-quinoline

Cincholepidine



FORMATION.—(1) From cinchonine by distillation with caustic potash.  
 (2) By saturating a mixture of methylal  $[CH_2(OCH_3)_2]$  and acetone with gaseous hydrochloric acid, and then heating this with aniline and concentrated hydrochloric acid

LITERATURE.—Thorpe, *Dic. Chemistry*, 4, 478

#### Dye Derived from Lepidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
611	QUINOLINE DYE Quinoline Blue		Quinoline [Amyl-iodide]	Photography

***p*-Leucaniline**

*See*, Triamino-triphenyl-methane

**Leuco-iso-naphthazarin**

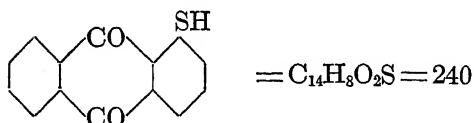
1:2:3:4-Tetrahydroxy-naphthalene (*not considered herein*)

**Leuco-naphthazarin**

1:2:5:8-Tetrahydroxy-naphthalene (*not considered herein*)

**Leucotrope**

Benzyl-dimethyl-phenyl-ammonium Chloride (*not considered herein*)

**Liebman and Studer's Acid**1-Naphthol-7-sulfonic Acid (*not considered herein*)**M Acid***See*, 1-Amino-5-naphthol-7-sulfonic Acid**1-(or 2-)Mercapto-anthraquinone**

FORMATION.—By forming mercapto-benzoyl-benzoic acid and then closing the ring

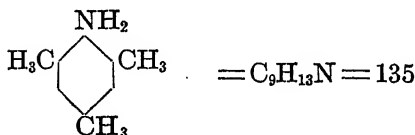
LITERATURE.—Barnett, Anthracene and Anthraquinone, 183, 184  
 Lange, Zwischenproducte, #3143-3147, 3527

**Dye Derived from 1-(or 2-)Mercapto-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
869	ANTHRAQUINONE AND ALLIED DYES Algol Brown B	I '14:— 1,596 I '20:— 4,727		V

***o*-Mercapto-benzoic Acid (C. A. nomen.)***See*, Thio-salicylic Acid**Mesidine (C. A. nomen.)**

2: 4: 6-Trimethyl-aniline



FORMATION.—By the nuclear methylation of aniline, whereby aniline hydrochloride is heated with methanol (methyl alcohol) under pressure at 300–350°. There is formed, in addition to mesidine, *p*- and *o*-toluidine, *m*-xylidine, etc.

LITERATURE.—Ullmann, Enzy. tech. Chemie, 8, 30

**Dye Derived from Mesidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
583	XANTHONE DYE Acid Rosamine A	I '14:— 50 I '20:— 141	Mesidine (2 mols) Resorcinol (2 mols) Phthalic Anhydride [PCl <sub>5</sub> ; Sulfonation] or [Dichloro-fluoresceine; Mesidine (2 mols); Sulfonation]	A

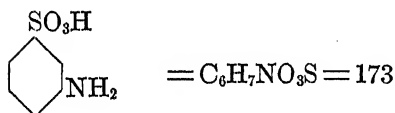
**Meta = *m***

*Note.*—This is not considered in the alphabetical arrangement, e.g. *meta*-Phenylene-diamine is indexed as *m*-Phenylene-diamine under “*P*.” However *m*-Phenylene-diamine precedes *p*-Phenylene-diamine

**Metanilic Acid** (*C. A. nomen.*)

*m*-Amino-benzene-sulfonic Acid

*m*-Sulfanilic Acid



STATISTICS.—Manufactured '17:— ?  
 Manufactured '18:—249,922 lbs.  
 Manufactured '19:—453,137 lbs.  
 Manufactured '20:—499,304 lbs.

FORMATION.—By sulfonating nitro-benzene with oleum, and reduction with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 47

Lange, Zwischenprodukte, #619, 620

## Dyes Derived from Metanilic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES			
134	Metanil Yellow	I '14:—284,606 M '17:— ? M '18:— ? M '19:—477,143 I '20:— 8,456 M '20:—629,437	Diphenylamine	A
135	Metanil Yellow Brominated		Diphenylamine [Bromination]	A
136	Acid Yellow MGS, GG		Diphenylamine [Sulfonation]	A
	DISAZO DYES			
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	Primuline-sulfonic Acid <i>m</i> -Phenylene-diamine- disulfonic Acid	D
256	Sulfon Black 3B		$\alpha$ -Naphthylamine Phenyl-1-naphthyl- amine-8-sulfonic Acid	A
257	Sulfocyanine	I '14:—145,694 M '17: ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	$\alpha$ -Naphthylamine or 1-Naphthylamine-6- and 7-sulfonic Acids Phenyl- or Toly- 1-naphthylamine- 8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:— 7,994	1-Naphthylamine-6- and 7-sulfonic Acids $\alpha$ -Naphthylamine	A
	TRIPHENYL-METHANE DYE			
542	Agalma Green B	I '14:— 2,294	4-Chloro-3:5-dinitro- benzene-sulfonic Acid Hydrol	A

Dyes Derived from Metanilic Acid (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
738	SULFUR DYE Cotton Black		1-Chloro-2: 4-dinitro-benzene [S + Na <sub>2</sub> S]	S

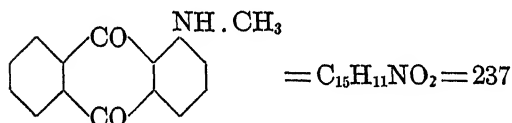
Methoxy-dimethylamino-benzophenone

See, 4-Dimethylamino-3-methoxy-benzophenone (C. A. nomen.)

6-Methoxy-*m*-toluidine (C. A. nomen. NH<sub>2</sub> = 1)

See, 2-Amino-*p*-cresol Methyl Ether

1-Methylamino-anthraquinone



FORMATION.—1-Chloro-anthraquinone is reacted with *p*-toluene-sulfon-methyl-amide (CH<sub>3</sub> · C<sub>6</sub>H<sub>4</sub> · SO<sub>2</sub> · NH · CH<sub>3</sub>), splitting off HCl and forming 1-(*p*-toluene-sulfon-methyl-amino)-anthraquinone. This latter readily decomposes in presence of sulfuric acid, forming 1-methylamino-anthraquinone

LITERATURE.—Lange, Zwischenprodukte, #3113, 3115, 3117, 3118, 3476  
Barnett, Anthracene and Anthraquinone, 197, etc.

Dye Derived from 1-Methylamino-anthraquinone

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
866	ANTHRAQUINONE AND ALLIED DYE Leucol Dark Green B	I '20:— 120		V

**2-Methylamino-8-naphthol-6-sulfonic Acid***See, Methyl-gamma Acid***7-Methylamino-1-naphthol-3-sulfonic Acid** (*C. A. nomen.*)*See, Methyl-gamma Acid***N-Methyl-aniline**

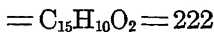
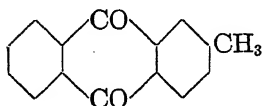
Methyl-aniline



FORMATION.—By heating aniline and methanol (methyl alcohol) in the presence of sulfuric acid in an autoclave; or by heating aniline hydrochloride and methanol in an autoclave

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 61  
Lange, *Zwischenprodukte*, #92

USES.—For preparation of ethyl-methyl-aniline and for benzyl-methyl-aniline

**2-Methyl-anthraquinone** (*C. A. nomen.*) $\beta$ -Methyl-anthraquinone

FORMATION.—Phthalic anhydride is dissolved in toluene, and heated with  $\text{AlCl}_3$  whereby *p*-toluyl-*o*-benzoic acid is formed, which latter, upon being dissolved in oleum and heated, forms the 2-methyl-anthraquinone

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 259  
Heller and Schülke, *Ber.* **41**, 3632 (1908)  
*Cf.* Elbs, *J. pr. Chem.* [II] **33**, 318 (1886)  
*Cf.* Limpricht and Wiegand, *Ann.* **311**, 178 (1900)

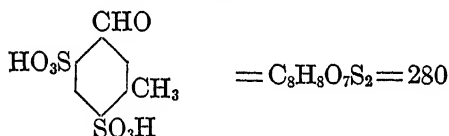
## Dyes Derived from 2-Methyl-anthraquinone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
759	ANTHRAQUINONE AND ALLIED DYES Anthraflavone G	I '14:— 7,143 I '20:— 2,354	2-Methyl-anthraquinone (2 mols)	V
792	Cibanone Orange R	I '20:— 6,125	[Sulfur]	V
795	Cibanone Yellow R	I '14:— 298 I '20:— 14,032	[Sulfur]	V

 $\beta$ -Methyl-anthraquinone

See, 2-Methyl-anthraquinone

## 3-Methyl-benzaldehyde-4:6-disulfonic Acid

4-Formyl-6-methyl-*m*-benzene-disulfonic Acid (*C. A. nomen.*)

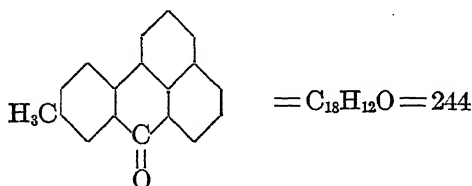
FORMATION.—Probably by oleum sulfonation of *m*-tolualdehyde (*m*-tolualdehyde can be made by oxidation of *m*-xylene)

LITERATURE.—Thorpe, *Dic Chemistry*, 5, 516

Cf. Lange, *Zwischenprodukte*, #784

## Dyes Derived from 3-Methyl-benzaldehyde-4:6-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
507	TRIPHENYL-METHANE DYES Xylene Blue VS	I '14:— 2,130 I '20:— 27,254	Diethyl-aniline (2 mols) [Oxidation]	A
508	Xylene Blue AS	I '14:— 8,238 I '20:— 5,573	Benzyl-ethyl-aniline (2 mols) [Oxidation]	A

**Methyl-benzanthrone**9-Methyl-7-*meso*-benzanthrenone (*C. A. nomen.*)

FORMATION.—By condensation of 2-methyl-anthrone with glycerol and sulfuric acid at about 120° C.

LITERATURE.—Barnett, Anthracene and Anthraquinone, 324

Fr. Pat. 407,593

Cf. Ger. Pat. 209,351. Frdl. 9, 836

**Dyes Derived from Methyl-benzanthrone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
793	ANTHRAQUINONE AND ALLIED DYES Cibanone Blue 3G		[Sulfur]	V
794	Cibanone Black B	I '14:— 2,802	[Sulfur]	V

**1-Methyl-2:4-diamino-benzene-5-sulfonic Acid**

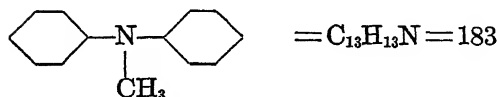
See, 4:6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*  
 $SO_3H=1$ )

**1-Methyl-2:6-diamino-benzene-4-sulfonic Acid**

See, 3:5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*  
 $SO_3H=1$ )

***N*-Methyl-diphenylamine (*C. A. nomen.*)**

Diphenyl-methyl-amine





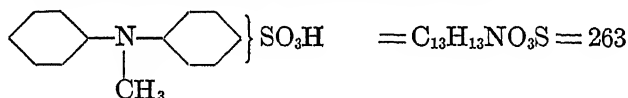
FORMATION.—From diphenylamine by heating with hydrochloric acid and methanol (methyl alcohol) in an autoclave at 250°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 73

**Dyes Derived from *N*-Methyl-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYES			
532	Alkali Violet 6B	I '14:— 3,020	Tetraethyl-diamino-benzophenone [Sulfonation]	A
534	Acid Violet 7B	I '14:— 21,665 I '20:— 51	Diethyl- <i>p</i> -amino-benzoyl Chloride <i>N</i> -Methyl-diphenylamine (2 mols)	A
547	Ketone Blue 4BN		Methoxy-dimethyl-amino-benzophenone [Sulfonation]	A

***N*-Methyl-diphenylamine-sulfonic Acid**



FORMATION.—By sulfonation of methyl-diphenylamine

LITERATURE.—Beilstein, Organische Chemie (3 auf.), II spl., 324

**Dye Derived from *N*-Methyl-diphenylamine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	TRIPHENYL-METHANE DYE			
533	Acid Violet 7BN		<i>p</i> -Dimethylamino-benzoyl chloride <i>N</i> -Methyl-diphenylamine-sulfonic Acid (2 mols)	A

*p*: *p*'-Methylene-bisaniline (*C. A. nomen.*)

*See, p*: *p*'-Diamino-diphenyl-methane

*p*: *p*'-Methylene-bis(*N*: *N*-diethyl-aniline) (*C. A. nomen.*)

*See, p*: *p*'-Tetraethyl-diamino-diphenyl-methane

*p*: *p*'-Methylene-bis(*N*: *N*-dimethyl-aniline) (*C. A. nomen.*)

*See, p*: *p*'-Tetramethyl-diamino-diphenyl-methane

4: 4'-Methylene-bis(*N*-methyl-*o*-toluidine) (*C. A. nomen.*)

*See, 4*: 4'-Dimethyl-diamino-3: 3'-ditolyl-methane

4: 4'-Methylene-bis-*o*-toluidine (*C. A. nomen.*)

*See, p*: *p*'-Diamino-ditolyl-methane

Methylene-bisxylylidine (*C. A. nomen.*)

*See, Diamino-dixylyl-methane*

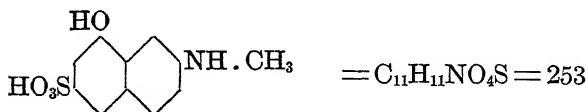
Methyl-ethyl-aniline

*See, Ethyl-methyl-aniline*

Methyl-gamma Acid

2-Methylamino-8-naphthol-6-sulfonic Acid

7-Methylamino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



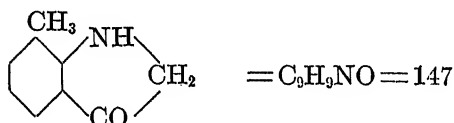
FORMATION.—G salt (Sodium salt of 2-naphthol-6:8-disulfonic acid) is heated in an autoclave with methylamine; and the resulting 2-methylamino-naphthalene-6:8-disulfonic acid is fused with caustic soda in an autoclave, forming methyl-gamma acid. (See Gamma acid)

LITERATURE.—Lange, Zwischenprodukte, #2550

Dye Derived from Methyl-gamma Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
347	DISAZO DYE Diphenyl Brown RN		Benzidine Salicylic Acid	D

7-Methyl-indoxyl



FORMATION.—*o*-Toluidine is reacted with chloro-acetic acid, forming *o*-tolyl-glycine. This body upon fusion with sodamide will in all probability form 7-methyl-indoxyl. (There is no direct reference in the literature to 7-methyl-indoxyl)

LITERATURE.—Lange, *Zwischenprodukte*, #241

Dye Derived from 7-Methyl-indoxyl

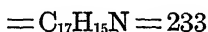
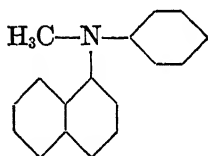
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
898	INDIGO GROUP DYE Helindone Violet D		Isatin [Bromination]	V

9-Methyl-7-meso-benzanthrenone (*C. A. nomen.*)

*See*, Methyl-benzanthrone

*N*-Methyl-*p*-nitroso-aniline (*C. A. nomen.*)

*See*, *p*-Nitroso-methyl-aniline

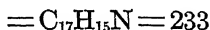
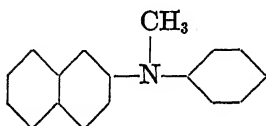
**Methyl-phenyl- $\alpha$ -naphthylamine***N*-Methyl-*N*-phenyl-1-naphthylamine (*C. A. nomen.*)

FORMATION.—Phenyl- $\alpha$ -naphthylamine is methylated by heating with methanol (methyl alcohol) and hydrochloric acid under pressure

LITERATURE.—Schultz, *Chemie des Steinkohlentheers* (3 aufl. 1900) 1, 117

**Dye Derived from Methyl-phenyl- $\alpha$ -naphthylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
522	TRIPHENYL-METHANE DYE Victoria Blue 4R	I '14:— 9,599 I '20:— 152	Ketone	B

**Methyl-(Ethyl)-phenyl- $\beta$ -naphthylamine***N*-Methyl-(Ethyl)-*N*-phenyl-2-naphthylamine (*C. A. nomen.*)

FORMATION.—Phenyl- $\beta$ -naphthylamine is methylated by heating in an autoclave with methanol (methyl alcohol) and hydrochloric acid

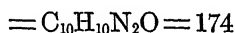
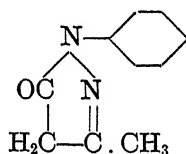
LITERATURE.—Lange, *Zwischenprodukte*, #2897

**Dye Derived from Methyl-(Ethyl-) phenyl-β-naphthylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
561	DIPHENYL-NAPHTHYL-METHANE DYE Acid Violet 5BNS	I '14:— 1,896	Ketone [Sulfonation]	A

**3-Methyl-1-phenyl-5-pyrazolone (C. A. nomen.)**

1-Phenyl-3-methyl-5-pyrazolone



STATISTICS.—Imported '14:—449 lbs.

FORMATION.—By heating the reaction product of phenyl-hydrazine and aceto-acetic ethyl ester

LITERATURE.—Lange, Zwischenprodukte. #138

**Dyes Derived from 3-Methyl-1-phenyl-5-pyrazolone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
21	PYRAZOLONE DYES Pigment Chrome Yellow L		Toluidine	CL
24	Pigment Fast Yellow R		<i>o</i> -Toluidine- <i>m</i> -sulfonic Acid	CL
26	Dianil Yellow R		Primuline-sulfonic Acid	D
28	Pigment Fast Yellow G	M '19:— ? I '20:— 170	<i>p</i> -Sulfo-anthranilic Acid	CL
29	Eriochrome Red B	I '14:— 5,491	1-Amino-2-naphthol-4-sulfonic Acid	CL

**2-Methyl-quinoline***See, Quinaldine (C. A. nomen.)***4-Methyl-quinoline (*N*=1)***See, Lepidine (C. A. nomen.)* **$\alpha$ -Methyl-quinoline***See, Quinaldine (C. A. nomen.)* **$\gamma$ -Methyl-quinoline***See, Lepidine (C. A. nomen.)***Methyl Resorcinol***See, Resorcinol Methyl Ether***3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone**1-(*p*-Sulfo-phenyl)-3-methyl-5-pyrazolone*p*-(4: 5-Dihydro-5-keto-3-methyl-1-pyrazolyl)-benzene-sulfonic  
Acid (*C. A. nomen.*)

**FORMATION.**—(1) By sulfonating 3-methyl-1-phenyl-5-pyrazolone by heating with 4 parts of 30 per cent oleum. (2) By heating phenylhydrazine-*p*-sulfonic acid with aceto-acetic ethyl ester in 50 per cent acetic acid solution for few hours

**LITERATURE.**—Cain, Intermediate Products (2d Ed.), 169

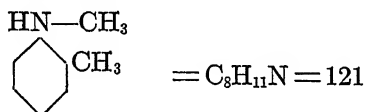
Lange, Zwischenprodukte, #138

Dyes Derived from 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
19	PYRAZOLONE DYES Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline	A
27	Dianil Yellow 2R		Primuline-sulfonic Acid	D

*N*-Methyl-*o*-toluidine (*C. A. nomen. NHR* = 1)

Methyl-*o*-toluidine



STATISTICS.—Manufactured '19:— ?

FORMATION.—(1) By heating *o*-toluidine, methanol (methyl alcohol) and hydrochloric acid in an autoclave. (2) By condensing *o*-toluidine and formaldehyde, and reducing to methyl-*o*-toluidine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 60, 70

Cf. Lange, Zwischenprodukte, #128

Dyes Derived from *N*-Methyl-*o*-toluidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
494	AURAMINE DYE Auramine G	I '14:— 1,902	Methyl- <i>o</i> -toluidine (2 mols) [Formaldehyde, sulfur, ammonium chloride, etc.]	B
501	TRIPHENYL-METHANE DYE Glacier Blue Brilliant Glacier Blue	I '14:— 2,495	Methyl- <i>o</i> -toluidine (2 mols) 2:5-Dichloro-benzaldehyde [Oxidation]	B
684	AZINE DYE Brilliant Rhoduline Red		<i>N</i> <sup>3</sup> -Ethyl-4- <i>m</i> -tolylene-diamine Aniline	B

**Michler's Hydrol**

*See*, Hydrol

**Michler's Ketone or Base**

*See*, Ketone

**Monochloro-benzene<sup>1</sup>**

*See*, Chloro-benzene

**Monoethyl-aniline<sup>1</sup>**

*See*, Ethyl-aniline

**Monomethyl-aniline<sup>1</sup>**

*See*, Methyl-aniline

**Mononitro-chloro-benzene<sup>1</sup>**

*See*, Chloro-nitro-benzene

**Monosulfonic Acid F**

*See*, 2-Naphthol-7-sulfonic Acid

**Monosulfo Acid H**

1-Amino-8-naphthol-3-sulfonic Acid (*not considered herein*)

**Mu Acid**

*See*, 1-Naphthylamine-6-sulfonic Acid

**Myrbane Oil**

*See*, Nitro-benzene

**Naphtha-**

*See also*, Naphtho-

 **$\alpha$ -Naphthahydroquinone**

1: 4-Dihydroxy-naphthalene (*not considered herein*)

 **$\beta$ -Naphthahydroquinone**

1: 2-Dihydroxy-naphthalene (*not considered herein*)

<sup>1</sup> "Mono" is superfluous and is consequently not recommended.



**Naphthalene** (*C. A. nomen.*)

Naphthalin

*Note.*—Naphthalene is a crude and not an intermediate as a rule



STATISTICS.—

		<i>Refined Naphthalene</i>	
		<i>Manufactured</i>	<i>Imported</i>
Calendar Year	1917:—	35,342,911 lbs.	267,057 lbs.
"	" 1918:—	33,701,779 lbs.	2,795 lbs.
"	" 1919:—	17,625,235 lbs.	7,650 lbs.
"	" 1920:—	30,230,734 lbs.	3,697,562 lbs.

FORMATION.—From coal tar by extraction and purification

LITERATURE.—Thorpe, *Dic. Chemistry*, 3, 560

**Dyes Derived from Naphthalene**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
564	DIPHENYL-NAPHTHYL-METHANE DYE Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol	A
758	ANTHRAQUINONE AND ALLIED DYES Sirius Yellow G		Phthalic anhydride	CL

**1: 5-Naphthalenediol** (*C. A. nomen.*)

*See*, 1: 5-Dihydroxy-naphthalene

**2: 7-Naphthalenediol** (*C. A. nomen.*)

*See*, 2: 7-Dihydroxy-naphthalene

**Naphthalene-1:5- and 1:6-disulfonic Acids**

The 1:5 acid is also called:

Armstrong's Acid

Armstrong's  $\delta$  Acid

Naphthalene- $\gamma$ -disulfonic Acid of Armstrong and Wynne

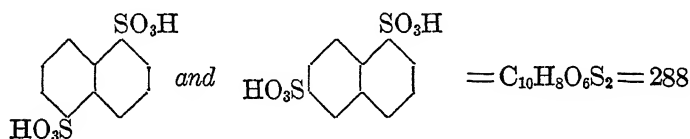
Naphthalene- $\delta$ -disulfonic Acid of Beilstein and Schultz

The 1:6-acid is also called:

Ewer and Pick's Acid

Naphthalene-? :  $\beta$ -disulfonic Acid of Armstrong and Wynne

Naphthalene- $\gamma$ -disulfonic Acid of Beilstein and Schultz



FORMATION.—The above acids are prepared by sulfonation of naphthalene with five parts of 23 per cent oleum at  $60^\circ$ ; or with five parts of ordinary sulfuric acid ( $66^\circ$ ) using first one part at  $180^\circ$  to form the  $\beta$ -sulfonic acid and then four parts at  $95\text{--}100^\circ$  for 20–24 hours

If the 1:5-acid alone is wanted the conditions of sulfonation are varied slightly, generally starting with the  $\alpha$ -sulfonic acid. The separation is effected by crystallizing out the 1:5 acid or its sodium salt from the diluted sulfonation product

LITERATURE.—Cain, Intermediate Products (2d Ed.), 176, 177

Thorpe, Dic. Chemistry, 3, 575

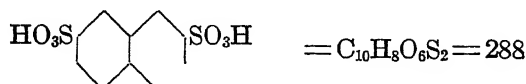
USES.—The mixed acids are used for the preparation of 1-naphthylamine-3:8- and 4:8-disulfonic acids, and the separation then made

The 1:5-acid is used for making naphthalene-1:3:5-trisulfonic acid

**Naphthalene-2:7-disulfonic Acid**

$\alpha$ -Naphthalene-disulfonic Acid (of Ebert and Merz)

Ebert and Merz  $\alpha$  Acid



STATISTICS.—Manufactured 1918, 1919, 1920 in undisclosed quantities

FORMATION.—Sodium 2-naphthalene-sulfonate is further sulfonated by dissolving in about two parts of monohydrate or a larger amount of 66° sulfuric acid, and heating to 180° for 6-8 hours. There is formed principally naphthalene-2: 6- and 2: 7-sulfonic acids, and the separation is effected through the calcium salts, the 2: 6 salt being less soluble

LITERATURE.—Lange, Zwischenprodukte, #2442

Ger. Pat. 61,730

Thorpe, Dic. Chemistry, 3, 577

**Dyes Derived from Naphthalene-2: 7-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
564	DIPHENYL-NAPHTHYL-METHANE DYE Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	Hydrol [Oxidation]	A

**Naphthalene-? : β-disulfonic Acid of Armstrong and Wynne**

See, Naphthalene-1: 6-disulfonic Acid

**Naphthalene-γ-disulfonic Acid of Armstrong and Wynne**

See, Naphthalene-1: 5-disulfonic Acid

**Naphthalene-δ-disulfonic Acid of Beilstein and Schultz**

See, Naphthalene-1: 5-disulfonic Acid

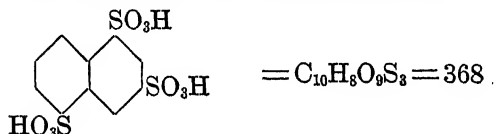
**Naphthalene-γ-disulfonic Acid of Beilstein and Schultz**

See, Naphthalene-1: 6-disulfonic Acid

**α-Naphthalene-disulfonic Acid of Ebert and Merz**

See, Naphthalene-2: 7-disulfonic Acid

**Naphthalene-1: 3: 5-trisulfonic Acid**



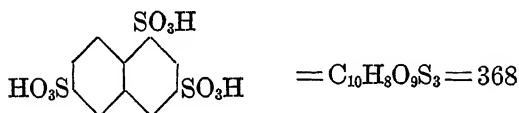
**FORMATION.**—By sulfonation of naphthalene-1:5-disulfonic acid

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 179  
 Thorpe, *Dic. Chemistry*, 3, 578

**USES.**—For preparation of 1-naphthylamine-4:6:8-trisulfonic acid

### **Naphthalene-1:3:6-trisulfonic Acid**

Trisulfonic Acid



**FORMATION.**—By sulfonating naphthalene for some hours at 180° with 24 per cent oleum, or preferably by sulfonating sodium naphthalene-β-sulfonate at a low temperature with forty per cent oleum

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 181  
 Lange, *Zwischenprodukte*, #2662  
 Thorpe, *Dic. Chemistry*, 3, 578

**USES.**—For preparation of 1-naphthol-3:6-disulfonic acid and 1-naphthylamine-3:6:8-trisulfonic acid. The latter acid is the last step prior to the manufacture of H acid (1-amino-8-naphthol-3:6-disulfonic Acid)

### **Naphthalic Acid**

Naphthalene-1:8-dicarboxylic Acid (*not considered herein*)

### **Naphthalidam**

*See, α-Naphthylamine*

### **Naphthalidine**

*See, α-Naphthylamine*

### **Naphthalidine-sulfonic Acid**

*See, Laurent's Acid*

**Naphthalidinic Acid**

*See, Laurent's Acid*

**Naphthalin**

*See, Naphthalene*

**Naphthapyrogallol**

1: 2: 3-Trihydroxy-naphthalene (*not considered herein*)

**$\alpha$ -Naphthaquinol**

1: 4-Dihydroxy-naphthalene (*not considered herein*)

**$\beta$ -Naphthaquinol**

1: 2-Dihydroxy-naphthalene (*not considered herein*)

**1: 2-Naphthaquinone**

*See, 1: 2-Naphthoquinone (C. A. nomen.)*

**$\alpha$ -Naphthaquinone**

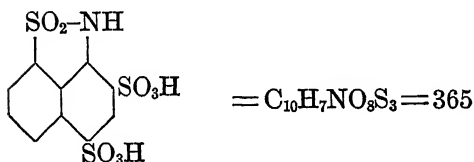
1: 4-Naphthoquinone (*not considered herein*)

**$\beta$ -Naphthaquinone**

*See, 1: 2-Naphthoquinone*

**1: 8-Naphthasultam-2: 4-disulfonic Acid**

4-Amino-4: 5-sultam-1: 3: 5-naphthalene-trisulfonic Acid (*C. A. nomen.*)



**FORMATION.**—The acid sodium 1-naphthylamine-4: 8-disulfonate is sulfonated with two parts of 40 per cent oleum, and warmed to 80–90°. This warming is continued until a sample no longer diazotizes and does not form a dye with diazotized sulfanilic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 201

USES.—For preparation of 1-amino-8-naphthol-2:4-disulfonic Acid

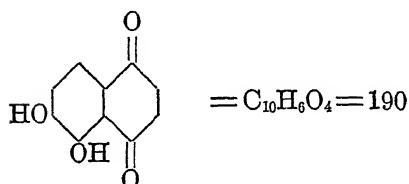
**Naphthazarin** (*C. A. nomen.*)

5:6-Dihydroxy-1:4-naphthoquinone

5:6-Dihydroxy- $\alpha$ -naphthoquinone

1:2-Dihydroxy-naphthoquinone

Oxy-juglone



FORMATION.—Crude dinitro-naphthalene (a mixture of 1:5- and 1:8-dinitro-naphthalene) is treated with oleum and sulfur

LITERATURE.—Georgievics and Grandmougin, Dye Chemistry, 333

Cf. Lange, Zwischenprodukte, #2759

Schultz, Farbstofftabellen (1914), #774

Thorpe, Dic. Chemistry, 3, 656, 569

**Dyes Derived from Naphthazarin**

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
774	ANTHRAQUINONE AND ALLIED DYES Alizarin Black	I '14:—205,439 I '20:— 17,421	[NaHSO <sub>3</sub> ]	M
775	Alizarin Dark Green W		Phenol	M

**1:2- $\beta$ -Naphthazoledione** (*C. A. nomen.*)

See,  $\beta$ -Naphthisatin

***o*-Naphthionic Acid**

*See*, 1-Naphthylamine-2-sulfonic Acid

**Naphthionic Acid**

Naphtholic Acid

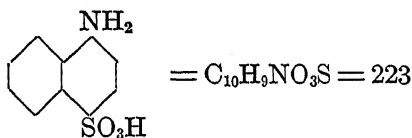
Piria's Acid

1-Naphthylamine-4-sulfonic Acid

1-Amino-naphthalene-4-sulfonic Acid

4-Amino-1-naphthalene-sulfonic Acid (*C. A. numbering*)

*Note.*—*C. A. nomenclature is Naphthionic Acid, but C. A. numbers from the -SO<sub>3</sub>H group, instead of from -NH<sub>2</sub> group, as is the usual procedure*



**STATISTICS.**—Manufactured '17:— ?  
 Manufactured '18:—1,462,216 lbs.  
 Manufactured '19:—2,008,189 lbs.  
 Manufactured '20:—3,773,191 lbs.

**FORMATION.**—By “baking”  $\alpha$ -naphthylamine and sulfuric acid plus a little oxalic acid in pans in an oven

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 189  
 Lange, *Zwischenprodukte*, #2359  
 Thorpe, *Dic. Chemistry*, 3, 590

**Dyes Derived from Naphthionic Acid**

<i>Schultz number or Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
52	MONOAZO DYES Archil Substitute V		<i>p</i> -Nitro-aniline	A
91	Anthracyl Chrome Green AD	I '14:— 4,596 M '18:— ? I '20:— 3,316	Picramic Acid	ACr

Dyes Derived from Naphthionic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
160	Naphthylamine Brown Fast Brown N	I '14:— 68,281 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	$\alpha$ -Naphthol	ACr
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	$\beta$ -Naphthol	A
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Nevile-Winther's Acid	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	1-Naphthol-5-sulfonic Acid	ACr
165	Azo Red A		1-Naphthol-3:6-disul- fonic Acid	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
167	Croceine Scarlet 3BX	I '14:— 13,101 M '17:— ? M '18:— ? M '19:— ? I '20:— 651 M '20:— ?	Croceine Acid	A



Dyes Derived from Naphthionic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
168	Amaranth	I '14:— 86,067 M '17:— 66,069 M '18:— 73,539 M '19:—294,416 I '20:— 110 M '20:—204,958	R Acid	A
169	Cochineal Red A	I '14:— 32,645 M '17:— ? M '18:— ? M '19:—231,519 M '20:—288,945	G Acid	A
170	Ponceau 6R		2-Naphthol-3: 6: 8- trisulfonic Acid	A
171	Chromotrope 8B	M '18:— ?	Chromotropic Acid	A
209	DISAZO DYES Terra Cotta FC	I '14:— 551	Primuline or Dehydro-thio- toluidine-sulfonic Acid <i>m</i> -Phenylene-diamine	D
213	Fast Brown	I '14:— 3,206 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol Naphthionic Acid (2 mols)	A
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	H Acid $\beta$ -Naphthol	A
307	Congo Red	I '14:— 20,629 M '17:— ? M '18:—587,153 M '19:—873,734 M '20:— 1,502,630	Benzidine Naphthionic Acid (2 mols)	D

## DYES CLASSIFIED BY INTERMEDIATES

Dyes Derived from Naphthionic Acid (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	DISAZO DYES ( <i>continued</i> )			
309	Glycine Red		Benzidine $\alpha$ -Naphthyl-glycine	D
311	Orange TA	I '14:— 602 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Cresol	D
312	Congo Corinth G	I '14:— 44,157 M '17:— ? M '18:— ? M '19:— 137,704 M '20:— 242,503	Benzidine Nevile-Winther's Acid	D
313	Congo Rubine	I '14:— 46,213 M '17:— ? M '18:— ? I '20:— 2,601	Benzidine Croceine Acid	D
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Salicylic Acid	D
356	Dianol Red 2B	I '14:— 4,422 I '20:— 17,632	Dichloro-benzidine Naphthionic Acid (2 mols)	D
363	Benzo Purpurin 4B	I '14:— 351,712 M '17:— ? M '18:— 356,522 M '19:— 288,021 I '20:— 3,492 M '20:— 617,629	Tolidine Naphthionic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Tolidine Broenner's Acid	D

**Dyes Derived from Naphthionic Acid** (*continued*)

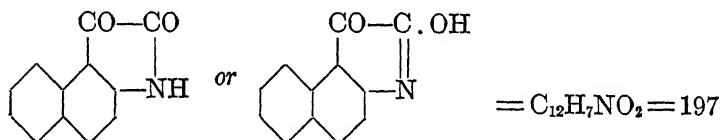
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
369	Brilliant Purpurin R	I '14:— 8,051	Tolidine Amino-R Acid	D
374	Congo 4R Congo Red 4R	M '18:— ?	Tolidine Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Nevile-Winther's Acid	D
405	Benzopurpurin 10B	I '14:— 47,768 M '18:— ? M '19:— ? I '20:— 2,205 M '20:— 41,265	Dianisidine Naphthionic Acid (2 mols)	D
407	Azo Violet		Dianisidine Nevile-Winther's Acid	D
	TRISAZO DYES			
479	Dianil Black R		Benzidine Chromotropic Acid <i>m</i> -Phenylene-diamine	D
481	Azo Corinth		Tolidine Resorcinol 3-Amino-1-phenol-4- sulfonic Acid	D
	TETRAKISAZO DYES			
487	Benzo Brown B	I '14:— 438 M '20:— ?	<i>m</i> -Phenylenc-diamine (3 mols) Naphthionic Acid (2 mols)	D
488	Toluylene Brown R	I '14:— 201	3: 5-Diamino- <i>p</i> -toluene- sulfonic Acid <i>m</i> -Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D

Dyes Derived from Naphthionic Acid (*continued*)

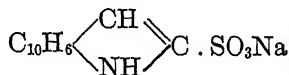
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
490	TETRAKISAZO DYES ( <i>continued</i> ) Cotton Brown A	I '14:— 29,074	Benzidine <i>m</i> -Phenylene-diamine (2 mols) Naphthionic Acid (2 mols)	D
563	DIPHENYL-NAPHTHYL- -METHANE DYE New Patent Blue B	I '14:— 595 I '20:— 1,814	Hydrol [Substitution of NH <sub>2</sub> by SO <sub>3</sub> H; Oxidation]	A

 **$\beta$ -Naphthisatin**

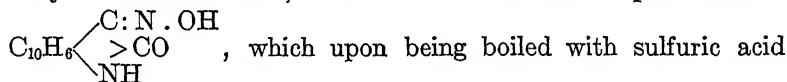
## 2-Naphthisatin

1: 2- $\beta$ -Naphthazoledione (*C. A. nomen. for keto form*)1: 2-Diketo-1: 2-dihydro- $\beta$ -naphthindole

FORMATION.— $\beta$ -Naphthylamine is reacted with glyoxal sodium bisulfite compound forming  $\beta$ -naphthindol-sulfonate



By adding acetic acid and sodium nitrite to a solution of this latter body in warm water, there results isonitroso-naphthoxindole



forms the  $\beta$ -naphthisatin

LITERATURE.—Beilstein, *Organische Chemie* (2 auf.) II, 624; II spl. 342  
Cf. Lange, *Zwischenprodukte*, #2965

Dyes Derived from  $\beta$ -Naphthisatin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
891	INDIGO GROUP DYES Ciba Green G	I '14:— 119	$\beta$ -Naphisatin (2 mols) [Bromination]	V
892	Helindone Green G	I '20:— 1,248	$\beta$ -Naphthisatin (2 mols) [Bromination]	V

## 2-Naphthisatin

*See,  $\beta$ -Naphthisatin*

## 1-Naphthol

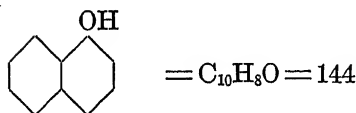
*See,  $\alpha$ -Naphthol*

## 2-Naphthol

*See,  $\beta$ -Naphthol*

 $\alpha$ -Naphthol

1-Naphthol (*C. A. nomen.*)



STATISTICS.—Imported '14:—405,578 lbs.  
 Manufactured '17:— 72,329 lbs.  
 Manufactured '18:—136,723 lbs.  
 Manufactured '19:—135,025 lbs.  
 Manufactured '20:— ?

FORMATION.—(1)Naphthalene is sulfonated cold to  $\alpha$ -naphthalene-sulfonic acid, which is then fused with caustic soda to form the  $\alpha$ -naphthol. (2)  $\alpha$ -Naphthylamine hydrochloride or sulfate is hydrolyzed to  $\alpha$ -Naphthol by heating with water in an autoclave

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 212  
 Lange, *Zwischenprodukte*, #2269–2271  
 Thorpe, *Dic. Chemistry*, 3, 614

Dyes Derived from  $\alpha$ -Naphthol

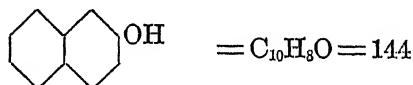
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	NITRO DYES			
6	Martius Yellow	I '14:— 3,295 I '20:— 26	[Dinitration]	A
7	Naphthol Yellow S	I '14:—251,222 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	[Dinitration, Sulfona- tion]	A
	MONOAZO DYES			
105	Sudan Brown	M '17:— ? M '18:— ? M '19:— ?	$\alpha$ -Naphthylamine	ss
144	Orange I	I '14:— 8,305 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,323 M '20:— 14,684	Sulfanilic Acid	A
160	Naphthylamine Brown Fast Brown N	I '14:— 68,281 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid	ACr
172	Fast Brown 3B	I '14:— 1,477	Broenner's Acid	A
180	Erio Chrome Blue Black B	I '14:— 57,000 M '17:— 9,326 M '18:— ? M '19:— ? I '20:— 20,371 M '20:— 29,255	1-Amino-2-naphthol-4- sulfonic Acid	ACr
183	Erio Chrome Black T	I '14:—129,550 M '18:— ? M '19:— ? I '20:— 2,624 M '20:— ?	Nitro-1-amino-2-naph- thol-4-sulfonic Acid	ACr

Dyes Derived from  $\alpha$ -Naphthol (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
212	DISAZO DYES			
	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	Sulfanilic Acid (2 mols)	A
214	Fast Brown O	I '14:— 2,000	Xylidino-sulfonic Acid (2 mols)	A
619	INDOPHENOL DYE			
	Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	Nitroso-dimethyl-aniline or Dimethyl- <i>p</i> -phenylene-diamine	V
	SULFUR DYE			
	Thiophor Indigo CJ		Dimethyl- <i>p</i> -phenylene-diamine [S+Na <sub>2</sub> S]	S
895	INDIGO GROUP DYE			
	Alizarin Indigo 3R	I '20:— 3,514	Dibromo-isatin Chloride	V

$\beta$ -Naphthol

2-Naphthol (*C. A. nomen.*)



STATISTICS.—Imported '14:— 1,264,525 lbs.  
 Manufactured '17:— 5,952,772 lbs.  
 Manufactured '18:— 5,254,637 lbs.  
 Manufactured '19:— 4,916,416 lbs.  
 Manufactured '20:—11,920,714 lbs.

FORMATION.—Naphthalene is sulfonated to  $\beta$ -naphthalene-sulfonic acid; this is fused with caustic soda, and the resulting  $\beta$ -naphthol is isolated and purified

LITERATURE.—Cain, Intermediate Products (2d Ed.), 212  
 Thorpe, Dic. Chemistry, 3, 614, 622

Dyes Derived from  $\beta$ -Naphthol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
2	NITROSO DYE Gambine Y Fast Printing Green		[Nitroso-derivative]	M
36	MONOAZO DYES Sudan I Oil Orange	I '14:— 4,554 M '17:— 32,455 M '18:— 29,670 M '19:— 75,868 M '20:— 116,624	Aniline	ss
46	<i>m</i> -Nitraniline Orange		<i>m</i> -Nitro-aniline	MF
56	Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	<i>p</i> -Nitro-aniline	MF
72	Pigment Orange R		<i>p</i> -Nitro- <i>o</i> -toluidine	CL MF
73	Pigment Fast Red HL Lithol Fast Scarlet R Helio Fast Red RL	I '14:— 49,708 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,001 M '20:— ?	<i>m</i> -Nitro- <i>p</i> -toluidine	CL
74	Tannin Orange R	I '14:— 2,202 I '20:— 347	<i>o</i> - and <i>p</i> -Amino-benzyl- dimethyl-amine	B
76	Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:— 170,658	Xylidine	ss
86	Azarine S		2-Amino-4: 6-dichloro- phenol	M
93	Pigment Purple A Sudan R	I '14:— 99	<i>o</i> -Anisidine	CL



Dyes Derived from  $\beta$ -Naphthol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
97	Chloranisidine Scarlet		Chloro-anisidine	MF
98	Naphthol Pink Nitrosamine Pink BX	I '14:—	99 <i>p</i> -Nitro- <i>o</i> -anisidine	MF
99	Tuscaline Orange G		<i>m</i> -Nitro- <i>o</i> -anisidine	CL MF
106	Carminc Naphth Garnet Autol Red RL	I '14:— 6,565 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	$\alpha$ -Naphthylamine	CL
115	Azo Turkish Red		$\beta$ -Naphthylamine	MF
126	Indoin Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	Safranine or <i>m</i> -Tolylenc-diamine <i>o</i> -Toluidine Aniline	B
131	Permanent Orange R		2-Amino-6-chloro-ben- zene-sulfonic Acid	CL
132	Lake Red P	I '14:— 60,345 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,750	<i>p</i> -Nitro-aniline- <i>o</i> -sul- fonic Acid	CL
145	Orange II	I '14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	Sulfanilic Acid	A

Dyes Derived from  $\beta$ -Naphthol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
148	Fast Orange O	I '14:— 1,250 M '17:— ?	<i>o</i> -Nitro-aniline- <i>p</i> - sulfonic Acid	CL
151	Orange T and RO	I '14:— 90,747 M '17:— ? M '19:— ? I '20:— 20 M '20:— ?	<i>o</i> -Toluidine- <i>m</i> -sulfonic Acid	A
153	Lake Red C	I '14:—306,607 M '19:— ? I '20:— 4,105 M '20:— ?	2-Chloro-5-toluidine- 4-sulfonic Acid	CL
156	Acid Alizarin Violet N Palatine Chrome Violet	I '14:— 1,199 M '19:— ? M '20:— ?	<i>o</i> -Amino-phenol- <i>p</i> -sul- fonic Acid	ACr
159	Acid Alizarin Black R	I '14:— 16,800 M '19:— ? I '20:— 439 M '20:— ?	2-Amino-6-nitro-1- phenol-4-sulfonic Acid	M
161	Fast Red A	I '14:— 46,359 M '17:—191,424 M '18:—242,215 M '19:—267,582 I '20:— 948 M '20:—433,989	Naphthionic Acid	A
162	Brilliant Fast Red G		Laurent's Acid	A
173	Lithol Red R	I '14:—281,963 M '17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	2-Naphthylamine-1- sulfonic Acid	CL

Dyes Derived from  $\beta$ -Naphthol (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
174	Double Brilliant Scarlet	I '14:—210,429 M '17:— ? M '20:— ?	Broenner's Acid	A
175	Ponceau for Silk	I '14:— 727	2-Naphthylamine-8- and 5-sulfonic Acids	A
181	Palatine Chrome Black 6B Salicine Black U	I '14:—248,721 M '17:— ? M '18:—469,159 M '19:—739,372 M '20:— 2,001 M '20:— 1,074,248	1-Amino-2-naphthol-4- sulfonic Acid	ACr
184	Erio Chrome Black A	I '14:— 96,570 M '17:— ? M '18:— ? M '19:—686,700 I '20:— 14,262 M '20:— ?	Nitro-1-amino-2-naph- thol-4-sulfonic Acid	ACr
185	Anthracene Chrome Black	I '14:— 51,577 I '20:— 2,339	2-Amino-3-naphthol-6- sulfonic Acid	M
193	Clayton Cloth Red Stanley Red	I '14:— 100 M '18:— ? M '19:— ? M '20:— ?	Dehydro-thio- <i>p</i> - toluidine-sulfonic Acid	A
200	Lake Red D	I '14:— 2,428 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Anthranilic Acid	CL
	DISAZO DYES			
223	Sudan III	I '14:— 2,409 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene	SS MF

Dyes Derived from  $\beta$ -Naphthol (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
232	Sudan IV	I '14:— 51 M '17:— 13,334 M '18:— 14,904 M '19:— ? M '20:— ?	<i>o</i> -Amino-azo-toluene	ss MF
239	Azotol C		Amino-chrysoidine or <i>p</i> -Amino-acetanilide and <i>m</i> -phenylene-diamine or <i>N</i> -Dimethyl- <i>p</i> : <i>p'</i> -dia- mino-azo-benzene	MF
240	Janus Red B	I '14:— 250 I '20:— 176	<i>m</i> -Amino-phenyl-tri- methyl-ammonium Chloride <i>m</i> -Toluidine	B
246	Cloth Scarlet G	I '14:— 9 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Amino-azo-benzene- sulfonic Acid	A
247	Double Scarlet Scarlet EC	I '14:— 39,522 M '17:— ? M '18:— 74,203 M '19:— ? M '20:— ?	Amino-azo-benzene- disulfonic Acid	A
252	Cloth Scarlet R		<i>o</i> -Amino-azo-toluene- sulfonic Acid	M
260	Erio Chrome Verdon A	I '14:— 882	Sulfanilic Acid <i>m</i> -Amino- <i>p</i> -cresol	ACr
264	Fast Sulfon Black F	M '19:— ? I '20:— 2,204 M '20:— ?	Naphthionic Acid H Acid	A

Dyes Derived from  $\beta$ -Naphthol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	DISAZO DYES ( <i>continued</i> )			
271	Diamine Blue 6G		Amino-G Acid 1-Amino-2-naphthol Ethyl Ether	D
288	Acid Alizarine Black SE Palatine Chrome Black F	I '14:— 19,185 I '20:— 34,302	2: 6-Diamino-phenol-4-sulfonic Acid $\beta$ -Naphthol (2 mols)	ACr
289	Acid Alizarine Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	2: 6-Diamino-phenol-4-sulfonic Acid Schaeffer's Acid	ACr
318	Benzidine Puce		Benzidine $\beta$ -Naphthol (2 mols)	MF
322	Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	Benzidine 1-Naphthol-3: 6: 8-tri-sulfonic Acid	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	1-Naphthol-3: 6: 8-tri-sulfonic Acid Tolidine	D
400	Milling Scarlet 4R Acid Anthracene Red 3B	I '14:— 18,330 I '20:— 2,336	<i>o</i> -Tolidine-disulfonic Acid $\beta$ -Naphthol (2 mols)	A
406	Diazurine B		Dianisidine 1-Naphthylamine-6-sulfonic Acid (2 mols) $\beta$ -Naphthol (2 mols on fiber)	D

Dyes Derived from  $\beta$ -Naphthol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
408	Dianisidine Blue	I '14:— 240	Dianisidine $\beta$ -Naphthol (2 mols)	D
409	Trisulfon Blue C	I '14:— 813	Dianisidine 1-Naphthol-3: 6: 8- trisulfonic Acid	D
419	Chicago Blue RW	I '14:— 15,176 M '19:— ? I '20:— 351 M '20:— ?	Dianisidine 1-Amino-8-naphthol- 2: 4-disulfonic Acid	D
434	Coomassie Navy Blue	I '20:— 42,357	1: 4-Naphthylene-dia- mine-2-sulfonic Acid R Acid	A
	DIPHENYL-NAPHTHYL- METHANE DYE			
566	Wool Green S	I '14:— 60,073 M '17:— ? M '19:— ? I '20:— 127,764 M '20:— 212,362	Ketone [Sulfonation]	A
	OXAZINE DYES			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,613 M '19:— ? I '20:— 5,240 M '20:— ?	Nitroso-dimethyl- aniline	B
650	New Blue B		Nitroso-dimethyl- aniline (2 mols)	B

Dyes Derived from  $\beta$ -Naphthol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
651	OXAZINE DYES ( <i>continued</i> ) New Methylene Blue GG		Nitroso-dimethyl- aniline [Dimethyl-amine, Oxidation] <i>or</i> [Meldola's Blue, Di- methyl-amine, Oxi- dation]	B
652	New Fast Blue F	I '14:— 2,502	Nitroso-dimethyl- aniline Hydrol <i>or</i> [Meldola's Blue; Hydrol]	B

$\alpha$ -Naphthol-carboxylic Acid

*See*, 1-Hydroxy-2-naphthoic Acid

$\beta$ -Naphthol-carboxylic Acid

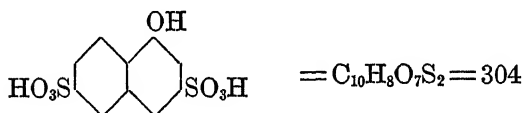
*See*, 3-Hydroxy-2-naphthoic Acid

1-Naphthol-3:6-disulfonic Acid (*C. A. nomen.*)

R G Acid

G R Acid

$\alpha$ -Naphthol-disulfonic Acid R G



STATISTICS.—Manufactured '19:— ?

Manufactured '20:— ?

**FORMATION.**—(1) By fusing sodium naphthalene-1:3:6-trisulfonate with half its weight of caustic soda and half its weight of water in an autoclave. (2) By diazotizing 1-naphthylamine-3:6-disulfonic acid and adding to boiling dilute sulfuric acid

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 218

Lange, *Zwischenprodukte*, #2636

Thorpe, *Dic. Chemistry*, 3, 619

### Dyes Derived from 1-Naphthol-3:6-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
64	MONOAZO DYES Azo Acid Red B Lanafuchsine	I '14:— 78,305	<i>p</i> -Amino-acetanilide	A
		M '17:— ?		
		M '18:— ?		
		M '19:— 15,272		
		I '20:— 674		
		M '20:— ?		
81	Palatine Scarlet A Brilliant Cochineal 2R	I '14:— 7,510	<i>m</i> -Xylidine	A
109	Palatine Red A	I '14:— 300 M '18:— ? M '19:— ?	<i>α</i> -Naphthylamine	A
165	Azo Red A		Naphthionic Acid	A
225	DISAZO DYES Croceine AZ	I '14:— 500	Amino-azo-benzene	A
		I '20:— 100		

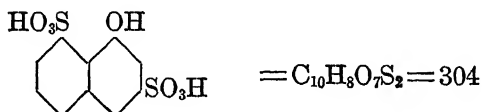
### 1-Naphthol-3:8-disulfonic Acid (*C. A. nomen.*)

Andresen's Acid

*ε*-Acid or Epsilon Acid

*α*-Naphthol-*ε*-disulfonic Acid

Disulfo Acid E





STATISTICS.—Manufactured '20:— ?

FORMATION.—Heat a solution of the acid sodium salt of 1-naphthylamine-3:8-disulfonic acid in an autoclave for 5 hours at 180°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 219

Lange, Zwischenprodukte, #2638, 2639

Thorpe, Dic. Chemistry, 3, 619

Dyes Derived from 1-Naphthol-3:8-disulfonic Acid

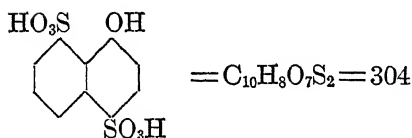
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
100	MONOAZO DYES Eosamine B	I '14:— 1,914	<i>m</i> -Amino- <i>p</i> -cresol-methyl ether	A
		I '20:— 1,600		
117	Erica 2 GN	I '14:— 1,171	Dehydro-thio- <i>p</i> -toluidine	D
		M '19:— ?		
		I '20:— 337		
121	Erica B	I '14:— 5,349	Dehydro-thio- <i>m</i> -xylidine	D
		M '19:— ?		
		I '20:— 2,393		
325	DISAZO DYES Columbia Blue R	I '14:— 3,071	Benzidine 1-Amino-8-naphthol-4-sulfonic Acid	D
387	Columbia Blue G	I '14:— 7,094	Tolidine 1-Amino-8-naphthol-4-sulfonic Acid	D
451	TRISAZO DYES Congo Fast Blue R	I '14:— 4,449	Tolidine $\alpha$ -Naphthylamine 1-Naphthol-3:8-disulfonic Acid (2 mols)	D
		M '18:— ?		
		I '20:— 723		
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495	Dianisidine $\alpha$ -Naphthylamine 1-Naphthol-3:8-disulfonic Acid (2 mols)	D
		I '20:— 1,821		

**1-Naphthol-4:8-disulfonic Acid** (*C. A. nomen.*)

Schoellkopf's Acid

 $\alpha$ -Naphthol-disulfonic Acid Sch $\alpha$ -Naphthol- $\delta$ -disulfonic Acid $\alpha$ -Naphthol-disulfonic Acid S

S Acid

**STATISTICS.**—Manufactured '19:— ?

**FORMATION.**—From 1-naphthylamine-4:8-disulfonic acid by diazotizing and running this diazo solution into dilute sulfuric acid. This latter is now boiled to complete the decomposition

**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 219Lange, *Zwischenprodukte*, #2647Thorpe, *Dic. Chemistry*, 3, 620**Dyes Derived from 1-Naphthol-4:8-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
<b>MONOAZO DYES</b>				
80	Wool Scarlet R	I '14:— 39,888	Xylidine	A
95	Azo Cochineal Cochineal Scarlet B	I '14:— 952	<i>o</i> -Anisidine	A
110	Buffalo Rubine		$\alpha$ -Naphthylamine	A
118	Geranine	I '14:— 18,917 M '19:— ? I '20:— 527	Dehydro-thio- <i>p</i> -toluidine	D
<b>DISAZO DYES</b>				
226	Croceine B		Amino-azo-benzene	A
235	Croceine 3B	M '19:— ? M '20:— ?	Amino-azo-toluene	A
321	Heliotrope 2B	I '14:— 1,473 I '20:— 60	Benzidine Croceine Acid	D

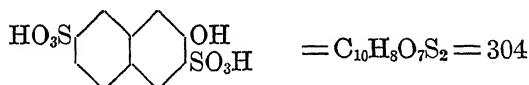
**2-Naphthol-3: 6-disulfonic Acid**

*See, R Acid*

**2-Naphthol-3: 7-disulfonic Acid (C. A. nomen.)**

$\beta$ -Naphthol- $\delta$ -disulfonic Acid

$\beta$ -Naphthol-disulfonic Acid F



FORMATION.—2-Naphthol-7-sulfonic acid is heated with 66° sulfuric acid for a considerable time at 120°

LITERATURE.—Lange, *Zwischenprodukte*, #2653, 2654  
 Thorpe, *Dic. Chemistry*, 3, 627

**Dye Derived from 2-Naphthol-3: 7-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
402	DISAZO DYE Diamine Blue Black E		Ethoxy-benzidine Gamma Acid	D

**2-Naphthol-6: 8-disulfonic Acid**

*See, G Acid*

**$\alpha$ -Naphthol- $\delta$ -disulfonic Acid**

*See, 1-Naphthol-4: 8-disulfonic Acid*

**$\alpha$ -Naphthol- $\epsilon$ -disulfonic Acid**

*See, 1-Naphthol-3: 8-disulfonic Acid*

**$\alpha$ -Naphthol-disulfonic Acid GR**

*See, 1-Naphthol-3: 6-disulfonic Acid*

**$\alpha$ -Naphthol-disulfonic Acid RG**

*See, 1-Naphthol-3: 6-disulfonic Acid*

**$\alpha$ -Naphthol-disulfonic Acid S**

*See*, 1-Naphthol-4: 8-disulfonic Acid

 **$\alpha$ -Naphthol-disulfonic Acid Sch**

*See*, 1-Naphthol-4: 8-disulfonic Acid

 **$\beta$ -Naphthol- $\alpha$ -disulfonic Acid**

*See*, R Acid

 **$\beta$ -Naphthol- $\beta$ -disulfonic Acid**

*See*, G Acid

 **$\beta$ -Naphthol- $\gamma$ -disulfonic Acid**

*See*, G Acid

 **$\beta$ -Naphthol- $\delta$ -disulfonic Acid**

*See*, 2-Naphthol-3: 7-disulfonic Acid

 **$\beta$ -Naphthol-disulfonic Acid C**

2-Naphthol-4: 8-disulfonic Acid (*not considered herein*)

 **$\beta$ -Naphthol-disulfonic Acid F**

*See*, 2-Naphthol-3: 7-disulfonic Acid

 **$\beta$ -Naphthol-disulfonic Acid G**

*See*, G Acid

 **$\beta$ -Naphthol-disulfonic Acid R**

*See*, R Acid

**Naphtholic Acid**

*See*, Naphthionic Acid

**1-Naphthol-4-sulfonic Acid**

*See*, Nevile-Winther's Acid

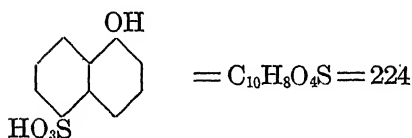
**1-Naphthol-5-sulfonic Acid** (*C. A. nomen.*)

L Acid

Cleve's Acid

$\alpha$ -Naphthol-sulfonic Acid C

$\alpha$ -Naphthol-sulfonic Acid L



STATISTICS.—Imported '14:—25,126 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—(1) From naphthalene-1:5-disulfonic acid by fusion with caustic soda. (2) From 1-naphthylamine-5-sulfonic acid by diazotizing, and boiling the diazo solution with dilute sulfuric acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 218

Lange, *Zwischenprodukte*, #2422–2424

Thorpe, *Dic. Chemistry*, 3, 617

**Dyes Derived from 1-Naphthol-5-sulfonic Acid**

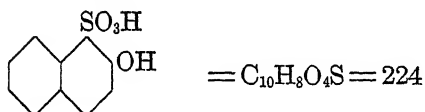
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
78	MONOAZO DYES Cochineal Scarlet 4R		Xylidine	A
108	Double Ponccau R		$\alpha$ -Naphthylamine	A
164	Fast Red VR	I '14:— 20,714 M '17:— ? M '18:— ? M '19:— ? I '20:— 6,290 M '20:— ?	Naphthionic Acid	ACr

Dyes Derived from 1-Naphthol-5-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
275	DISAZO DYES Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid $\alpha$ -Naphthylamine	ACr
411	Benzoazurine 3G	I '20:— 201	Dianisidine 1-Naphthol-5-sulfonic Acid (2 mols)	D

## 2-Naphthol-1-sulfonic Acid

Tobias Acid

*(Falsely called  $\beta$ -naphthyl-sulfuric Acid)*

STATISTICS.—Manufactured in 1918, 1919, 1920 in indeterminate amounts

FORMATION.—By sulfonating  $\beta$ -naphthol with 2-2½ parts of 90-92 per cent sulfuric acid at about 40°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 222

Lange, *Zwischenprodukte*, #2427

Thorpe, *Dic. Chemistry*, 3, 624

USES.—For preparation of 2-naphthylamine-1-sulfonic acid

## 2-Naphthol-6-sulfonic Acid

*See, Schaeffer's Acid*

**2-Naphthol-7-sulfonic Acid** (*C. A. nomen.*)

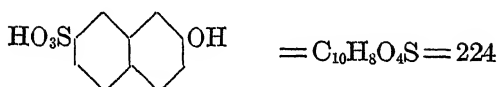
$\beta$ -Naphthol- $\delta$ -sulfonic Acid

$\beta$ -Naphthol-sulfonic Acid F

F Acid

Monosulfonic Acid F

Cassella's Acid



STATISTICS.—Imported '14:—1,996 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—By fusing sodium naphthalene-2:7-disulfonate with caustic soda solution in an autoclave

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 224

Lange, *Zwischenprodukte*, #2434

Thorpe, *Dic. Chemistry*, 3, 625

**Dyes Derived from 2-Naphthol-7-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
56	MONOAZO DYE Paranitriline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ?	<i>p</i> -Nitro-aniline [ $\beta$ -Naphthol]	MF

**2-Naphthol-8-sulfonic Acid**

*See, Croceine Acid*

**$\alpha$ -Naphthol-sulfonic Acid  $\delta$**

1-Naphthol-8-sulfonic Acid (*not considered herein*)

**$\alpha$ -Naphthol-sulfonic Acid C**

*See, 1-Naphthol-5-sulfonic Acid*

 **$\alpha$ -Naphthol-sulfonic Acid L**

*See, 1-Naphthol-5-sulfonic Acid*

 **$\alpha$ -Naphthol-sulfonic Acid NW**

*See, Nevile-Winther's Acid*

 **$\alpha$ -Naphthol-sulfonic Acid S**

1-Naphthol-8-sulfonic Acid (*not considered herein*)

 **$\beta$ -Naphthol- $\alpha$ -sulfonic Acid of Armstrong and Schultz**

*See, Schaeffer's Acid*

 **$\beta$ -Naphthol- $\alpha$ -sulfonic Acid (of Bayer & Co.'s patents)**

*See, Croceine Acid*

 **$\beta$ -Naphthol- $\beta$ -sulfonic Acid**

*See, Schaeffer's Acid*

 **$\beta$ -Naphthol- $\gamma$ -sulfonic Acid**

2-Naphthol-5-sulfonic Acid (*not considered herein*)

 **$\beta$ -Naphthol- $\delta$ -sulfonic Acid**

*See, 2-Naphthol-7-sulfonic Acid*

 **$\beta$ -Naphthol-sulfonic Acid B**

*See, Croceine Acid*

 **$\beta$ -Naphthol-sulfonic Acid F**

*See, 2-Naphthol-7-sulfonic Acid*

 **$\beta$ -Naphthol-sulfonic Acid S**

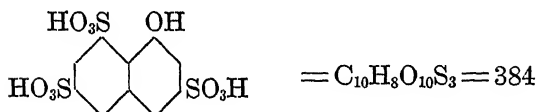
*See, Schaeffer's Acid*



$\beta$ -Naphthol-sulfonic Acid Schaeffer

See, Schaeffer's Acid

1-Naphthol-3:6:8-trisulfonic Acid (*C. A. nomen.*)



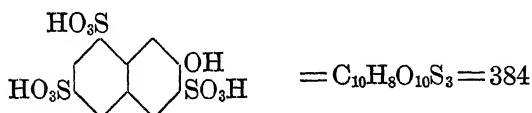
STATISTICS.—Imported '14:—6,443 lbs.  
 Manufactured '18:— ?  
 Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—From 1-naphthylamine-3:6:8-trisulfonic acid by diazo-tizing in the presence of a large excess of sulfuric acid and then boiling and purifying

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 221  
 Lange, *Zwischenprodukte*, #2785, 2786  
 Thorpe, *Dic. Chemistry*, 3, 621

Dyes Derived from 1-Naphthol-3:6:8-trisulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
322	DISAZO DYES Trisulfon Violet B	I '14:— 1,124 M '17:— ? M '18:— ? M '19:— ? I '20:— 7,927 M '20:— ?	Benzidine $\beta$ -Naphthol.	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	Tolidine $\beta$ -Naphthol	D
409	Trisulfon Blue B	I '14:— 813	Dianisidine $\beta$ -Naphthol	D

**2-Naphthol-3:6:8-trisulfonic Acid** (*C. A. nomen.*) $\beta$ -Naphthol-trisulfonic Acid

STATISTICS.—Manufactured '19:— ?

FORMATION.—From  $\beta$ -naphthol by sulfonation with 2 parts of concentrated sulfuric acid at 70–80°, then with 2 more parts of concentrated sulfuric acid at 120°, and finally with 2 parts of 40 per cent oleum at 150°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 229Lange, *Zwischenprodukte*, #2792Thorpe, *Dic. Chemistry*, 3, 628Ullmann, *Enzy. tech. Chemie*, 8, 351**Dyes Derived from 2-Naphthol-3:6:8-trisulfonic Acid**

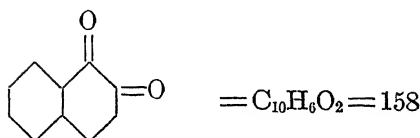
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
170	MONOAZO DYE Ponceau 6R		Naphthionic Acid	A
228	DISAZO DYE Ponceau 5R Erythrine P	I '14:— 2,880 M '17:— ? M '18:— ?	Amino-azo-benzene	A

 **$\beta$ -Naphthol-trisulfonic Acid***See*, 2-Naphthol-3:6:8-trisulfonic Acid **$\alpha$ -Naphthol-trisulfonic Acid S**1-Naphthol-2:4:8-trisulfonic Acid (*not considered herein*)**Naphtho-picric Acid**2:4:5-Trinitro-1-naphthol (*not considered herein*)

**1: 2-Naphthoquinone** (*C. A. nomen.*)

$\beta$ -Naphthaquinone

1: 2-Naphthaquinone



**FORMATION.**—From Orange II as follows: Sulfanilic acid is diazotized and coupled with  $\beta$ -naphthol to form Orange II. This azo dye is reduced with stannous chloride to 1-amino-2-naphthol, which is oxidized with sodium bichromate and sulfuric acid to  $\beta$ -naphthoquinone

**LITERATURE.**—Thorpe, *Dic. Chemistry*, 3, 654

Lange, *Zwischenprodukte*, #23, 648, 2408

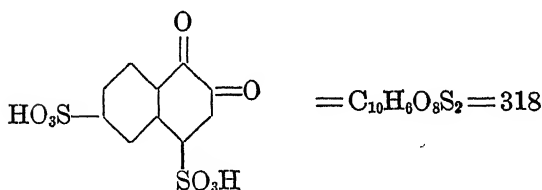
**Dye Derived from 1: 2-Naphthoquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
667	THIAZINE DYE Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '20:— 3,214 M '20:— ?	Ethyl-sulfobenzyl- <i>p</i> -phenylene-diamine-thiosulfonic Acid	M

**1: 2-Naphthoquinone-4: 6-disulfonic Acid**

$\beta$ -Naphthoquinone-4: 6-disulfonic Acid

3: 4-Dihydro-3: 4-diketo-1: 7-naphthalene-disulfonic Acid (*C. A. nomen.*)



FORMATION.—1-Nitroso-2-naphthol-6-sulfonic acid is treated with bisulfite forming 1-amino-2-naphthol-4:6-disulfonic acid. This latter body is now oxidized with nitric acid under 15°, resulting in 1:2-naphthoquinone-4:6-disulfonic acid

LITERATURE.—Ullmann, Enzy. tech. Chemie, 8, 358

Cf. Lange, Zwischenprodukte, #2408

Thorpe, Dic. Chemistry, 3, 657

### Dyes Derived from 1:2-Naphthoquinone-4:6-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
666	THIAZINE DYES Indochromogen S		Diethyl- <i>p</i> -phenylenediamine-thiosulfonic Acid	M
667	Brilliant Alizarin Blue G Indochromine T	I '14:— 19,481 M '19:— ? I '19:— 3,214 M '20:— ?	Dimethyl- <i>p</i> -phenylenediamine-thiosulfonic Acid	M

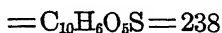
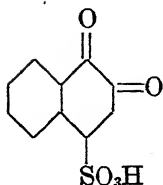
### $\beta$ -Naphthoquinone-4:6-disulfonic Acid

See, 1:2-Naphthoquinone-4:6-disulfonic Acid

### 1:2-Naphthoquinone-4-sulfonic Acid

$\beta$ -Naphthoquinone-4-sulfonic Acid

3:4-Dihydro-3:4-diketo-1-naphthalene-sulfonic Acid (C. A. nomen.)



FORMATION.—2-Amino-1-naphthol-4-sulfonic acid or 1-amino-2-naphthol-4-sulfonic acid is oxidized with nitric acid

LITERATURE.—Ullmann, *Enzy. tech. Chemie*, **8**, 358  
 Thorpe, *Dic. Chemistry*, **3**, 657  
 Cf. Lange, *Zwischenprodukte*, #2631

**Dyes Derived from 1:2-Naphthoquinone-4-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
656	OXAZINE DYES Alizarin Green G	M '19:— ?	1-Amino-2-naphthol-6-sulfonic Acid	M
657	Alizarin Green B	I '14:— 551	2-Amino-1-naphthol-4-sulfonic Acid	M

**$\beta$ -Naphthoquinone-4-sulfonic Acid**

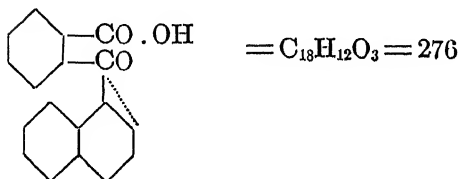
*See*, 1:2-Naphthoquinone-4-sulfonic Acid

**Naphtho-resorcin**

1:3-Dihydroxy-naphthalene (*not considered herein*)

**Naphthoyl-benzoic Acid**

*o*-1-Naphthoyl-benzoic Acid (*C. A. nomen.*)



FORMATION.—From phthalic anhydride and naphthalene by heating together in the presence of benzene and aluminium chloride

LITERATURE.—Lange, *Zwischenprodukte*, #2812  
 Schultz, *Farbstofftabellen* (1914), #758

## Dye Derived from Naphthoyl-benzoic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
758	ANTHRAQUINONE AND ALLIED DYES Sirius Yellow G			CL

## Naphthsultam-disulfonic Acid S

1-Naphthylamine-2: 4: 8-trisulfonic Acid (*not considered herein*)

## 1-Naphthylamine

*See, α-Naphthylamine*

## 2-Naphthylamine

*See, β-Naphthylamine*

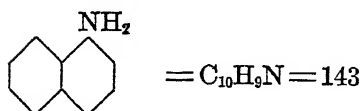
## α-Naphthylamine

1-Naphthylamine (*C. A. nomen.*)

α-Amino-naphthalene

Naphthalidam

Naphthalidine



STATISTICS.—Imported '14:— 112,226 lbs.  
 Manufactured '17:—3,516,686 lbs.  
 Manufactured '18:—2,671,601 lbs.  
 Manufactured '19:—1,552,828 lbs.  
 Manufactured '20:—5,177,547 lbs.

FORMATION.—Naphthalene is mononitrated, using mixed acid, and the resulting α-nitro-naphthalene is reduced with iron and hydrochloric acid to α-naphthylamine

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 181  
 Lange, *Zwischenprodukte*, #2262  
 Thorpe, *Dic. Chemistry*, 3, 586

Dyes Derived from  $\alpha$ -Naphthylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES			
105	Sudan Brown	M' 17:— ? M' 18:— ? M' 19:— ?	$\alpha$ -Naphthol	SS
106	Carmin Naphth Garnet Autol Red RL	I '14:— 6,565 M' 17:— ? M' 18:— ? M' 19:— ? M' 20:— ?	$\beta$ -Naphthol	CL
107	Sulfamine Brown A	I '14:— 132 M' 18:— ? M' 19:— ? I '20:— 2,630 M' 20:— ?	Nitroso- $\beta$ -naphthol	M
108	Double Ponceau R		1-Naphthol-5-sulfonic Acid	A
109	Palatine Red A	I '14:— 300 M' 18:— ? M' 19:— ?	1-Naphthol-3: 6-disul- fonic Acid	A
110	Buffalo Rubine		1-Naphthol-4: 6-disul- fonic Acid	A
111	Fast Red BT	M' 17:— ? M' 18:— ? M' 19:— ?	Schaeffer's Acid	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M' 17:—120,595 M' 18:—200,415 M' 19:—161,862 I '20:— 7,882 M' 20:—217,406	R Acid	A
113	Crystal Ponceau	I '14:— 628	G Acid	A
114	Chromotrope 10B	M' 19:— ?	Chromotropic Acid	A

Dyes Derived from  $\alpha$ -Naphthylamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
218	DISAZO DYES Nigrophor B A S F		1-Amino-8-naphthol-5-sulfonic Acid 2: 5-Dichloro-aniline	MF
220	Palatine Black A	I '14:—299,274 I '20:—200	1-Amino-8-naphthol-4-sulfonic Acid Sulfanilic Acid	A
241	Neutral Gray G	I '14:—2,546 M '19:—? I '20:—3,472 M '20:—?	Aniline Gamma Acid	D
243	Coomassie Wool Black R		Acetyl- <i>p</i> -phenylene-diamine Schaeffer's Acid	A
244	Coomassie Wool Black S	M '18:—? M '19:—?	Acetyl- <i>p</i> -phenylene-diamine R Acid	A
245	Nyanza Black B		<i>p</i> -Nitro-aniline [Reduced] Gamma Acid	D
256	Sulfon Black 3B		Metanilic Acid Phenyl-1-naphthyl-amine-8-sulfonic Acid	A
257	Sulfocyanine	I '14:—145,694 M '17:—? M '18:—? M '19:—? I '20:—18,327 M '20:—?	Metanilic Acid Phenyl- or Toly- 1-naphthylamine-8-sulfonic Acid	A
258	Naphthalene Acid Black 4B	I '14:—7,994	Metanilic Acid 1-Naphthylamine-6- and 7-sulfonic Acids	A
261	Buffalo Black 10B	M '17:—? M '18:—? M '19:—? M '20:—?	Sulfanilic Acid H Acid	A



Dyes Derived from  $\alpha$ -Naphthylamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
262	Victoria Black B	I '14:— 557	Sulfanilic Acid 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
263	Jet Black R		Aniline-2: 4-disulfonic Acid Phenyl- $\alpha$ -naphthylamine	A
265	Sulfocyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthylamine-8-sulfonic Acid	A
266	Naphthylamine Black D	I '14:—152,141 M '17:— ? M '18:— 29,724 M '19:— ? I '20:— 1,687 M '20:— ?	Freund's Acid $\alpha$ -Naphthylamine (2 mols)	A
267	Anthracite Black	I '14:— 99 M '17:— ? I '20:— 220	Freund's Acid Diphenyl- <i>m</i> -phenylenediamine	A
267	Phenylene Black		1-Naphthylamine-4: 7-disulfonic Acid Diphenyl- <i>m</i> -phenylenediamine	A
268	Naphthyl Blue Black N		1-Naphthylamine-4: 6- and 4: 7-disulfonic Acids 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4: 6- and 4: 7-disulfonic Acids R Acid	A

Dyes Derived from  $\alpha$ -Naphthylamine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid R Acid	A
273	Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1:4-diamino- naphthalene-6-sul- fonic Acid Schaeffer's Acid	D
274	Diaminogen B	I '14:—313,629 I '20:— 18,120	Acetyl-1:4-diamino- naphthalene-6-sul- fonic Acid Gamma Acid	D
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	Amino-salicylic Acid Nevile-Winther's Acid or 1-Naphthol-5- sulfonic Acid	ACr
276	Diamond Green B	I '14:— 8,622 M '18:— ? I '20:— 4,061	Amino-salicylic Acid 1:8-Dihydroxy-naph- thalene-4-sulfonic Acid	ACr
278	Biebrich Patent Black		1-Naphthylamine-6- and 7-sulfonic Acids etc.	A
290	Violet Black		Nevile-Winther's Acid <i>p</i> -Phenylene-diamine or Amino-acetanilide	D
382	Azo Mauve B	M '17:— ? M '20:— ?	Tolidine H Acid	D

Dyes Derived from  $\alpha$ -Naphthylamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Applica- tion Class</i>
432	DISAZO DYES (continued) Diamine Cutch Naphthylene Violet		1: 5-Naphthylenc-dia- minc-3: 7-disulfonic Acid $\alpha$ -Naphthylamine (2 mols)	D
435	TRISAZO DYES Janus Brown B		Trimethyl- <i>m</i> -amino- phenyl-ammonium Chloride Aniline <i>m</i> -Phenylene-diamine or <i>p</i> -Amino-benzyl- diethyl-amine Resorcinol <i>m</i> -Phenylene-diamine	B
441	Diazo Blue Black RS	M '19:— ? M '20:— ?	Benzidine H Acid (2 mols)	D
442	Direct Black V	I '14:—145,738	Benzidine 2R Acid Gamma Acid	D
443	Direct Indone Blue R		Benzidine 2R Acid H Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine Salicylic Acid H Acid	D
447	Benzo Gray S	I '14:— 802	Benzidine Salicylic Acid Nevile-Winther's Acid	D
450	Benzo Black Blue R		Tolidine Nevile-Winther's Acid (2 mols)	D

Dyes Derived from  $\alpha$ -Naphthylamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	Tolidine 1-Naphthol-3: 8-disul- fonic Acid (2 mols)	D
452	Benzo Indigo Blue		Tolidine 1: 8-Dihydroxy-naph- thalene-4-sulfonic Acid (2 mols)	D
456	Congo Fast Blue B Benzo Fast Blue B	I '14:—100,495 I '20:— 1821	Dianisidine 1-Naphthol-3: 8-disul- fonic Acid	D
459	Benzo Black Blue G	*	Benzidine-disulfonic Acid Nevile-Winther's Acid (2 mols)	D
460	Benzo Black Blue 5G	I '14:— 602	Benzidine-disulfonic Acid 1: 8-Dihydroxy-naph- thalene-4-sulfonic Acid (2 mols)	D
	OXAZINE DYE			
653	Nile Blue A	I '14:— 1,518 I '20:— 1,241	5-Diethylamino-2- nitroso-phenol	B
	AZINE DYES			
671	Induline Scarlet	I '14:— 198 I '20:— 154	Ethyl- <i>p</i> -toluidine	B
672	Azo Carmine G	I '14:— 17,500 M '17:— ? M '18:— ? M '19:— ? I '20:— 196 M '20:— ?	Aniline (3 mols) [Disulfonation]	A
673	Azo Carmine B	I '20:— 549	Aniline (3 mols) [Trisulfonation]	A

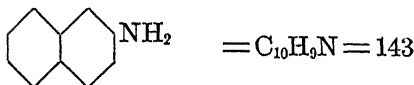
Dyes Derived from  $\alpha$ -Naphthylamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	<p>AZINE DYES (continued)</p>			
674	Rosinduline 2G	I '20:— 201	Aniline (3 mols) [Trisulfonation, heated to 160°] or [Azo Carmine B heated to 160°]	A
693	Milling Blue	I '14:— 3,082	Aniline (3 mols) $\alpha$ -Naphthylamine (2 mols) [Sulfonation]	M
694	Rose Magdala Fast Pink for Silk	I '14:— 597	$\alpha$ -Amino-azo-naphthalene	A

$\beta$ -Naphthylamine

2-Naphthylamine (*C. A. nomen.*)

$\beta$ -Amino-naphthalene



STATISTICS.—Imported '14:—11,204 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:—31,317 lbs.  
 Manufactured '19:—99,597 lbs.  
 Manufactured '20:— ?

FORMATION.—From  $\beta$ -naphthol by heating in an autoclave with ammonium sulfite and ammonia.

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 187  
 Lange, *Zwischenprodukte*, #2262  
 Thorpe, *Dic. Chemistry*, 3, 598

Dyes Derived from  $\beta$ -Naphthylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
115	MONOAZO DYES Azo Turkish Red		$\beta$ -Naphthol	MF
116	Sulfamine Brown B		Nitroso- $\beta$ -naphthol [Sodium bisulfite]	M
281	DISAZO DYES Azidine Fast Scarlet 4BS		<i>o</i> -Toluidine Sulfo- <i>m</i> -tolylene-dia- mine-bis(carbonyl- amino-naphthol- sulfonic Acid)	D
282	Azidine Fast Scarlet 7BS		$\beta$ -Naphthylamine (2 mols) Sulfo- <i>m</i> -tolylene-dia- mine-bis(carbonyl- amino-naphthol- sulfonic Acid)	D
287	Toluylene Orange RR	I '14:— 500	$\beta$ -Naphthylamine (2 mols) 3:5-Diamino- <i>p</i> -toluene- sulfonic Acid	D
301	Hessian Purple N	I '14:— 465	$\beta$ -Naphthylamine (2 mols) Diamino-stilbene-disul- fonic Acid	D
383	Naphthazurine B	I '14:— 4,782	Tolidine H Acid	D
433	Coomassie Black B		1:4-Naphthylene-dia- mine-2-sulfonic Acid R Acid	A

Dyes Derived from  $\beta$ -Naphthylamine (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
541	TRIPHENYL-METHANE DYE Brilliant Dianil Blue 6G		$\beta$ -Naphthylamine (3 mols) Aniline <i>o</i> -Toluidine <i>p</i> -Toluidine [Disulfonation] or $\beta$ -Naphthylamine (3 mols) [Rosaniline; Disulfonation]	B
831	ANTHRAQUINONE DYE Indanthrene Red BN	I '14:— 6,056 I '20:— 4,766	1-Chloro-anthraquinone-2-carboxylic Acid	V

1-Naphthylamine-3:6-disulfonic Acid

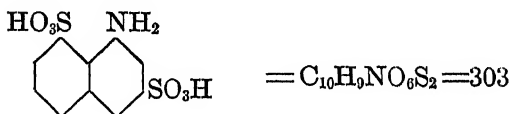
See, Freund's Acid

1-Naphthylamine-3:8-disulfonic Acid

$\alpha$ -Naphthylamine- $\epsilon$ -disulfonic Acid

$\epsilon$  Acid or Epsilon Acid

8-Amino-1:6-naphthalene-disulfonic Acid (*C. A. nomen.*)



STATISTICS.—Manufactured in 1919 and 1920 but in undisclosed quantities

FORMATION.—Naphthalene-1:5- and 1:6-disulfonic acids are nitrated and reduced, resulting in 1-naphthylamine-3:8- and 4:8-disulfonic acids. The separation is effected by crystallizing out the acid sodium salt of 1-naphthylamine-3:8-disulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 196  
 Lange, Zwischenprodukte, #2575, 2576  
 Thorpe, Dic. Chemistry, 3, 592

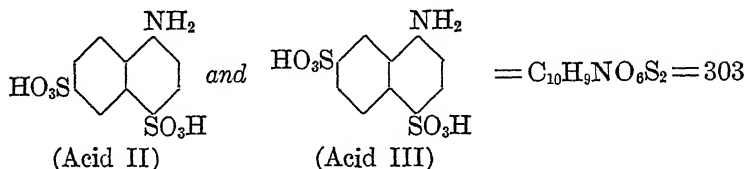
### 1-Naphthylamine-4: 6- and 4: 7-disulfonic Acids

$\alpha$ -Naphthylamine-disulfonic Acids D

Dahl's Acids II and III (*respectively*)

4-Amino-1: 6-naphthalene-disulfonic Acid (*C. A. nomen.*)

4-Amino-1: 7-naphthalene-disulfonic Acid (*C. A. nomen*)



STATISTICS.—Manufactured '20:— ?

FORMATION.—From naphthionic acid by sulfonation with 25 per cent oleum

LITERATURE.—Cain, Intermediate Products (2d Ed.), 198  
 Thorpe, Dic. Chemistry, 3, 593, 594  
 Lange, Zwischenprodukte, #2577-2582

### Dyes Derived from 1-Naphthylamine-4: 6- and 4: 7-disulfonic Acids

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
54	MONOAZO DYES Apollo Red B	I '14:— 904	<i>p</i> -Nitro-aniline	A
267	DISAZO DYES Phenylene Black	I '14:— 99 M '17:— ? I '20:— 220	$\alpha$ -Naphthylamine Dipheny- <i>m</i> -phenylene-diamine [4: 7 Acid only]	A
268	Naphthyl Blue Black N		$\alpha$ -Naphthylamine 1-Amino-2-naphthol Ethyl Ether	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	$\alpha$ -Naphthylamine R Acid	A



**1-Naphthylamine-4:8-disulfonic Acid**

$\delta$  Acid or Delta Acid

Schoellkopf's Acid

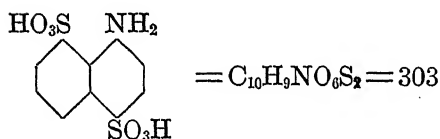
Disulfo-acid S

4-Amino-1:5-naphthalene-disulfonic Acid (*C. A. nomen.*)

$\alpha$ -Naphthylamine- $\delta$ -disulfonic Acid

$\alpha$ -Naphthylamine-disulfonic Acid S

S Acid



STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

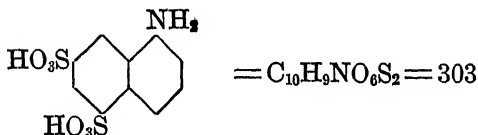
FORMATION.—When naphthalene-1:5- and 1:6-disulfonic acids are nitrated and reduced, there is formed a mixture of 1-naphthylamine-3:8- and 4:8-disulfonic acids. See under 1-naphthylamine-3:8-disulfonic acid. The 4:8-acid is also made by sulfonating 1-naphthylamine-8-sulfonic acid with three parts of 10 per cent oleum.

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 200  
 Lange, *Zwischenprodukte*, #2575, 2583-2585  
 Thorpe, *Dic. Chemistry*, 3, 594

USES.—For making 1-amino-8-naphthol-4-sulfonic acid, 1:8-dihydroxy-naphthalene-4-sulfonic acid, and 1:8-naphthasultam-2:4-disulfonic acid

**1-Naphthylamine-5:7-disulfonic Acid**

5-Amino-1:3-naphthalene-disulfonic Acid (*C. A. nomen.*)



FORMATION.—By sulfonation of the acetyl derivative of 1-naphthylamine-5-sulfonic acid or of  $\alpha$ -naphthylamine

LITERATURE —Cain, Intermediate Products (2d Ed ), 200  
 Lange, Zwischenprodukte, #2586  
 Thorpe, Dic. Chemistry, 3, 594

USES.—For preparation of 1-amino-5-naphthol-7-sulfonic acid

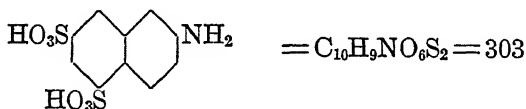
### 2-Naphthylamine-3:6-disulfonic Acid

*See*, Amino-R Acid

### 2-Naphthylamine-5:7-disulfonic Acid

6-Amino-1:3-naphthalene-disulfonic Acid (*C. A. nomen.*)

$\beta$ -Naphthylamine-disulfonic Acid II of Armstrong and Wynne  
 Armstrong and Wynne's Acid II



STATISTICS.—Manufactured in 1919 and 1920 in undisclosed amounts

FORMATION.—By sulfonation of either 2-naphthylamine-5-sulfonic acid, or  $\beta$ -naphthylamine, or 2-naphthylamine-7-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 208  
 Lange, Zwischenprodukte, #2598  
 Thorpe, Dic. Chemistry, 3, 605

USES.—For preparation of J acid (2-amino-5-naphthol-7-sulfonic acid)

### 2-Naphthylamine-6:8-disulfonic Acid

*See*, Amino-G Acid

### $\alpha$ -Naphthylamine- $\alpha$ -disulfonic Acid

*See*, Freund's Acid

**$\alpha$ -Naphthylamine- $\beta$ -disulfonic Acid**

1-Naphthylamine-3:7-disulfonic Acid (*not considered herein*)

**$\alpha$ -Naphthylamine- $\delta$ -disulfonic Acid**

*See*, 1-Naphthylamine-4:8-disulfonic Acid

**$\alpha$ -Naphthylamine- $\epsilon$ -disulfonic Acid**

*See*, 1-Naphthylamine-3:8-disulfonic Acid

**$\alpha$ -Naphthylamine-disulfonic Acids D**

*See*, 1-Naphthylamine-4:6- and 4:7-disulfonic Acids

**$\alpha$ -Naphthylamine-disulfonic Acid S**

*See*, 1-Naphthylamine-4:8-disulfonic Acid

**$\beta$ -Naphthylamine- $\alpha$ -disulfonic Acid**

*See*, Amino-R Acid

**$\beta$ -Naphthylamine- $\gamma$ -disulfonic Acid**

*See*, Amino-G Acid

**$\beta$ -Naphthylamine- $\delta$ -disulfonic Acid**

2-Naphthylamine-2:7-disulfonic Acid (*not considered herein*)

**$\beta$ -Naphthylamine-disulfonic Acid II of Armstrong and Wynne**

*See*, 2-Naphthylamine-5:7-disulfonic Acid

**$\beta$ -Naphthylamine-disulfonic Acid C**

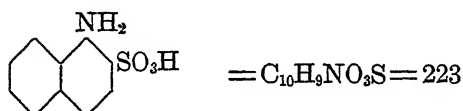
2-Naphthylamine-4:8-disulfonic Acid (*not considered herein*)

**$\beta$ -Naphthylamine-disulfonic Acid F**

2-Naphthylamine-3:7-disulfonic Acid (*not considered herein*)

**$\beta$ -Naphthylamine-disulfonic Acid G**

*See*, Amino-G Acid

**$\beta$ -Naphthylamine-disulfonic Acid R***See, Amino-R Acid***Naphthylamine Ether***See, 1-Amino-2-naphthol Ethyl Ether***1-Naphthylamine-2-sulfonic Acid** $\lambda$  Acid*o*-Naphthionic Acid1-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '18:— ?

Manufactured '19:— ?

FORMATION.—By heating naphthionic acid and naphthalene in a pan fitted with a stirrer and reflux condenser, at the boiling point of naphthalene (217°) for few hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 189

Thorpe, Dic. Chemistry, 3, 589

Lange, Zwischenprodukte, #2352–2355

**Dye Derived from 1-Naphthylamine-2-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
562	DIPHENYL-NAPHTHYL-METHANE DYE Fast Acid Blue B	I '14:— 33,251 I '20:— 6,478	Hydrol [Oxidation]	A

**1-Naphthylamine-4-sulfonic Acid***See, Naphthionic Acid*

**1-Naphthylamine-5-sulfonic Acid**

*See, Laurent's Acid*

**1-Naphthylamine-6-sulfonic Acid**<sup>1</sup>

$\alpha$ -Naphthylamine- $\beta$ -sulfonic Acid

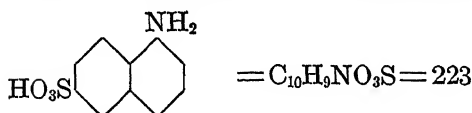
$\alpha$ -Naphthylamine- $\beta$ -sulfonic Acid Cl

Cleve's  $\beta$  Acid

Cleve's Acid

Erdmann's  $\mu$  Acid or  $\mu$  Acid

5-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



STATISTICS.—Imported '14:—5,493 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—From naphththionic acid by heating with sulfuric acid at 120–130°

LITERATURE.—Lange, *Zwischenprodukte*, 2363

Thorpe, *Dic. Chemistry*, 3, 591

*Cf. Cain, Intermediate Products (2d Ed.)*, 192

**Dyes Derived from 1-Naphthylamine-6-sulfonic Acid**

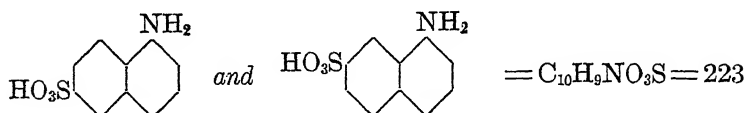
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
406	DISAZO DYE Diazurine B		1-Naphthylamine-6-sulfonic Acid (2 mols) Dianisidine $\beta$ -Naphthol (2 mols on fiber)	D <sub>1</sub>
492	TETRAKISAZO DYE Anthracene Acid Brown B		1-Naphthylamine-6-sulfonic Acid (2 mols) Amino-salicylic Acid (2 mols) <i>m</i> -Phenylene-diamine	M <sub>1</sub> ACr

<sup>1</sup> See 1-Naphthylamine-6- and 7-sulfonic Acids, page 400

## 1-Naphthylamine-6- and 7-sulfonic Acids

Cleve's Acids

Naphthylamine-sulfonic Acids Cleve

 $\alpha$ -Naphthylamine-sulfonic Acids Cl5-and 8-Amino-2-naphthalene-sulfonic Acids (*C. A. nomen.*)

FORMATION.—Naphthalene is sulfonated hot to  $\beta$ -naphthalene-sulfonic acid, this latter in sulfuric acid solution is nitrated cold with mixed acid. The excess acidity is removed with ground limestone ( $\text{CaCO}_3$ ), and the nitro-compounds reduced with iron borings and a little acetic acid to a mixture of 1-naphthylamine-6-and-7-sulfonic acids

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 192

Lange, *Zwischenprodukte*, #2363, 2364

Thorpe, *Dic. Chemistry*, 3, 591

## Dyes Derived from 1-Naphthylamine-6- and 7-sulfonic Acids

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
242	DISAZO DYES Sulfon Black G		Aniline 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
257	Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,325 M '20:— ?	Metanilic Acid Phenyl- or Toly- 1-naphthylamine- 8-sulfonic Acid	A

Dyes Derived from 1-Naphthylamine-6- and 7-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
258	Naphthalene Acid Black 4B	I '14:— 7,794	Metanilic Acid $\alpha$ -Naphthylamine	A
265	Sulfonycyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid Phenyl-1-naphthyl- amine-8-sulfonic Acid	A
277	Anthracene Acid Black	I '14:— 17,793	Amino-salicylic Acid, etc.	M
278	Biebrich Patent Black		$\alpha$ -Naphthylamine, etc.	A
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	<i>p</i> -Phenylene-diamine Gamma Acid <i>m</i> -Phenylene-diamine	D
458	Carbon Black		<i>p</i> -Phenylene-diamine- sulfonic Acid from <i>p</i> -nitro-aniline- <i>o</i> -sul- fonic Acid <i>m</i> -Phenylene-(or Toly- lene-)-diamine or 1:3-naphthylene-dia- mine-6-sulfonic Acid (2 mols)	D

1-Naphthylamine-7-sulfonic Acid

$\alpha$ -Naphthylamine- $\theta$ -sulfonic Acid

Cleve's  $\theta$  Acid

Cleve's  $\delta$  Acid

Cleve's Acid

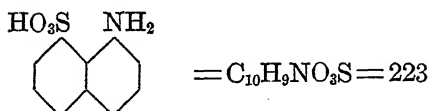
See, 1-Naphthylamine-6- and 7-sulfonic Acids

**1-Naphthylamine-8-sulfonic Acid**8-Amino-1-naphthalene-sulfonic Acid (*C. A. nomen.*) $\alpha$ -Naphthylamine-sulfonic Acid S

S Acid

Peri Acid

Schoellkopf's Acid



STATISTICS.—Manufactured '19:— ?

Manufactured '20:—562,939 lbs.

FORMATION.—Naphthalene is sulfonated at 60° to  $\alpha$ -naphthalene-sulfonic acid and then nitrated below 40° to 1-nitro-naphthalene-8-sulfonic acid, which latter upon reduction with iron furnishes the 1-naphthylamine-8-sulfonic acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 193

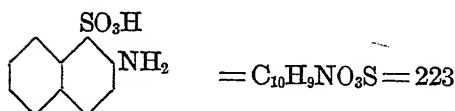
Lange, Zwischenprodukte, #2365

Thorpe, Dic. Chemistry, 3, 591

USES.—For manufacture of 1-naphthylamine-4:8-disulfonic acid

**2-Naphthylamine-1-sulfonic Acid**

Tobias Acid

2-Amino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '18:— ?

Manufactured '19:— 84,260 lbs.

Manufactured '20:—325,036 lbs.



FORMATION.—Sodium 2-naphthol-1-sulfonate (from  $\beta$ -naphthol and sulfuric acid at 40°) is heated with ammonium hydrogen sulfite and ammonia in an autoclave at from 100° to 150°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 205

Lange, *Zwischenprodukte*, #2367

Thorpe, *Dic. Chemistry*, 3, 601

**Dyes Derived from 2-Naphthylamine-1-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
173	MONOAZO DYES Lithol Red R	I '14:—281,963 M '17:— ? M '18:—353,104 M '19:—269,169 M '20:— ?	$\beta$ -Naphthol	CL
179	Lake Bordeaux B		3-Hydroxy-2-naphthoic Acid	CL

**2-Naphthylamine-5-sulfonic Acid**

$\beta$ -Naphthylamine- $\gamma$ -sulfonic Acid

$\beta$ -Naphthylamine-sulfonic Acid D

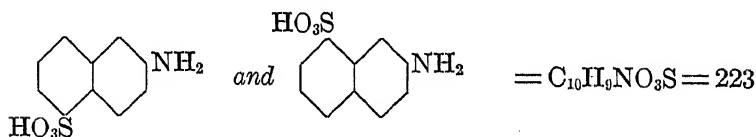
Dahl's Acid

Forsling's Acid II

*See, 2-Naphthylamine-5- and 8-sulfonic Acids*

**2-Naphthylamine-5- and 8-sulfonic Acids<sup>1</sup>**

6- and 7-Amino-1-naphthalene-sulfonic Acids (*C. A. nomen.*)



STATISTICS.—Imported '14:—23,265 lbs. for the 2-naphthylamine-8-sulfonic Acid

<sup>1</sup> See 2-Naphthylamine-5-sulfonic Acid and 2-Naphthylamine-8-sulfonic Acid,

FORMATION.—By sulfonation of  $\beta$ -naphthylamine

LITERATURE.—Cain, Intermediate Products (2d Ed.), 205  
 Lange, Zwischenprodukte, #2368-2370, 2380-2383  
 Thorpe, Dic. Chemistry, 3, 601, 603

**Dye Derived from 2-Naphthylamine-5- and 8-sulfonic Acids**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
175	MONOAZO DYE Ponceau for Silk	I '14:— 727	$\beta$ -Naphthol	A

**2-Naphthylamine-6-sulfonic Acid**

*See*, Broenner's Acid

**2-Naphthylamine-7-sulfonic Acid**

$\beta$ -Naphthylamine- $\delta$ -sulfonic Acid

$\beta$ -Naphthylamine-sulfonic Acid F

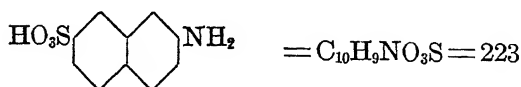
F Acid

Delta Acid

Bayer's Acid

Cassella's Acid F

7-Amino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—Sodium 2-naphthol-7-sulfonic acid (from caustic soda fusion of naphthalene-2:7-disulfonic acid) is heated with ammonium acid sulfite solution and ammonia water in an autoclave at 100° to 150°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 207  
 Lange, Zwischenprodukte, #2377-2379  
 Thorpe, Dic. Chemistry, 3, 602

**Dyes Derived from 2-Naphthylamine-7-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
340	DISAZO DYES Chlorazol Orange 2R		Benzidine Salicylic Acid	D
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058 M '17:— ? M '18:— ? I '20:— 1,896	Tolidine Broenner's Acid	D
367	Diamine Red 3B Deltapurpurin 7B		Tolidine 2-Naphthylamino-7-sul- sulfonic Acid (2 mols)	D
371	Rosazurine G		Tolidine Ethyl-2-naphthyl- amine-7-sulfonic Acid	D

**2-Naphthylamine-8-sulfonic Acid**

$\beta$ -Naphthylamine- $\alpha$ -sulfonic Acid

Badische Acid

Forsling's Acid I

*See, 2-Naphthylamine-5 and -8-sulfonic Acids*

**$\alpha$ -Naphthylamine- $\beta$ -sulfonic Acid**

*See, 1-Naphthylamine-6-sulfonic Acid*

**$\alpha$ -Naphthylamine- $\delta$ -sulfonic Acid**

*See, 1-Naphthylamine-7-sulfonic Acid*

**Naphthylamine-sulfonic Acid Br**

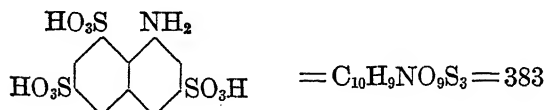
*See, Broenner's Acid*

**$\alpha$ -Naphthylamine- $\beta$ -sulfonic Acid Cl**

*See, 1-Naphthylamine-6-sulfonic Acid*

**$\alpha$ -Naphthylamine-sulfonic Acids Cl***See*, 1-Naphthylamine-6-and 7-sulfonic Acids**Naphthylamine-sulfonic Acids Cleve***See*, 1-Naphthylamine-6-and 7-sulfonic Acids **$\alpha$ -Naphthylamine-sulfonic Acid L***See*, Laurent's Acid **$\alpha$ -Naphthylamine-sulfonic Acid S***See*, 1-Naphthylamine-8-sulfonic Acid **$\beta$ -Naphthylamine- $\alpha$ -sulfonic Acid***See*, 2-Naphthylamine-8-sulfonic Acid **$\beta$ -Naphthylamine- $\beta$ -sulfonic Acid***See*, Broenner's Acid **$\beta$ -Naphthylamine- $\gamma$ -sulfonic Acid***See*, 2-Naphthylamine-5-sulfonic Acid **$\beta$ -Naphthylamine- $\delta$ -sulfonic Acid***See*, 2-Naphthylamine-7-sulfonic Acid **$\beta$ -Naphthylamine-sulfonic Acid D***See*, 2-Naphthylamine-5-sulfonic Acid **$\beta$ -Naphthylamine-sulfonic Acid F***See*, 2-Naphthylamine-7-sulfonic Acid**1-Naphthylamine-3: 6: 8-trisulfonic Acid**

Koch's Acid

8-Amino-1: 3: 6-naphthalene-trisulfonic Acid (*C. A. nomen.*)

STATISTICS.—Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '19:—1,418,560 lbs.  
 Manufactured '20:—3,921,950 lbs.

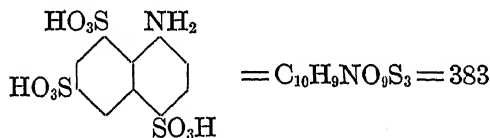
FORMATION.—Naphthalene is sulfonated to naphthalene-1:3:6-trisulfonic acid, using oleum; and this trisulfonic acid is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202  
 Lange, Zwischenprodukte, #2747, 2748  
 Thorpe, Dic. Chemistry, 3, 595

USES.—For preparation of H acid (1-Amino-8-naphthol-3:6-disulfonic acid)

**1-Naphthylamine-4:6:8-trisulfonic Acid**

8-Amino-1:3:5-naphthalene-trisulfonic Acid (*C. A. nomen.*)



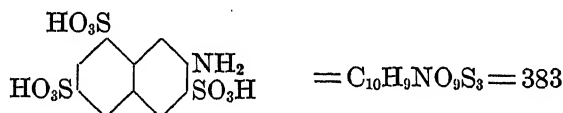
FORMATION.—Sodium naphthalene-1:5-disulfonate is sulfonated to naphthalene-1:3:5-trisulfonic acid, and this is nitrated cold, and then reduced with iron

LITERATURE.—Cain, Intermediate Products (2d Ed.), 202  
 Lange, Zwischenprodukte, #2750  
 Thorpe, Dic. Chemistry, 3, 596

USES.—For preparation of K acid (1-amino-8-naphthol-4:6-disulfonic acid)

**2-Naphthylamine-3:6:8-trisulfonic Acid**

7-Amino-1:3:6-naphthalene-trisulfonic Acid (*C. A. nomen.*)



FORMATION.—By sulfonation of amino-G acid (as potassium or sodium salt of 2-naphthylamine-6:8-disulfonic acid) with 40 per cent oleum at 80–90° and finally at 120–130°. The amino-G acid is made by amidation of G salt or by sulfonating  $\beta$ -naphthylamine

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 210

Lange, *Zwischenprodukte*, #2757

Thorpe, *Dic. Chemistry*, 3, 606

USES.—For making 2R acid (2-Amino-8-naphthol-3:6-disulfonic Acid)

**4-(Naphthyl-azo)-1-naphthylamine** (*C. A. nomen.*)

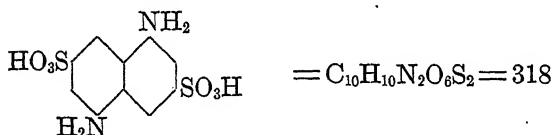
*See, o-Amino-azo-naphthalene*

**1-Naphthyl-diphenyl-methane** (*C. A. nomen.*)

*See, Diphenyl-naphthyl-methane*

**1:5-Naphthylene-diamine-3:7-disulfonic Acid**

4:8-Diamino-2:6-naphthalene-disulfonic Acid (*C. A. nomen.*)



FORMATION.—Naphthalene-2:6-disulfonic acid (from sulfonation of naphthalene) is dissolved in sulfuric acid and nitrated at 20–30°. The resulting 1:5-dinitro-naphthalene-3:7-disulfonic acid is salted out and reduced

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 178

Lange, *Zwischenprodukte*, #2700

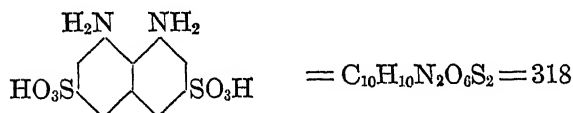
Thorpe, *Dic. Chemistry*, 3, 613

**Dyes Derived from 1:5-Naphthylene-diamine-3:7-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
431	DISAZO DYES Diamine Golden Yellow		Phenol (2 mols) [Ethylation]	D
432	Diamine Cutch Naphthylene Violet	I '14:— 300 I '20:— 49	$\alpha$ -Naphthylamine (2 mols)	D

1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

4: 5-Diamino-2: 7-naphthalene-disulfonic Acid (*C. A. nomen.*)



FORMATION.—Naphthalene-2: 7-disulfonic acid (from sulfonation of naphthalene) is dissolved in strong sulfuric acid and is then dinitrated warm with strong nitric acid and sodium nitrate. The dinitro-acid is reduced

LITERATURE.—Lange, Zwischenprodukte, #2704

Cf. Cain, Intermediate Products (2d Ed.), 178

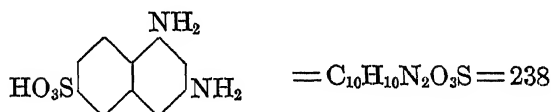
Thorpe, Dic. Chemistry, 3, 613

Dyes Derived from 1: 8-Naphthylene-diamine-3: 6-disulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
55	MONOAZO DYE Brilliant Archil C.	I '14:— 401	p-Nitro-aniline	A

1: 3-Naphthylene-diamine-6-sulfonic Acid

5: 7-Diamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—1-Naphthylamine-3: 6-disulfonic acid (by nitration and reduction of naphthalene-2: 7-disulfonic acid) is heated with ammonia in an autoclave at 160–180°

LITERATURE.—Lange, Zwischenprodukte, #2483

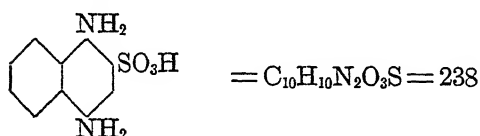
Thorpe, Dic. Chemistry, 3, 612

Cf. Cain, Intermediate Products (2d Ed.), 195

## Dye Derived from 1:3-Naphthylene-diamine-6-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
458	TRISAZO DYE Carbon Black		1:3-Naphthylene-diamine-6-sulfonic Acid (2 mols) <i>p</i> -Nitro-aniline- <i>o</i> -sulfonic Acid 1-Naphthylamine-6- or 7-sulfonic Acid	D

## 1:4-Naphthylene-diamine-2-sulfonic Acid

1:4-Diamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—By reduction of the azo derivatives of 1-naphthylamine-2-sulfonic acid

LITERATURE.—*Cf.* Thorpe, *Dic. Chemistry*, 3, 611, 612.

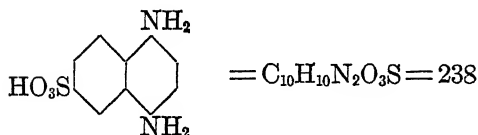
## Dyes Derived from 1:4-Naphthylene-diamine-2-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
433	DISAZO DYES Coomassie Black B		R Acid $\beta$ -Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	R Acid $\beta$ -Naphthol	A
461	TRISAZO DYE Coomassie Union Black		Gamma Acid <i>m</i> -Phenylene- (or Toly- lene-)diamine or Resorcinol (2 mols)	D



**1: 4-Naphthylene-diamine-6-sulfonic Acid**

5: 8-Diamino-2-naphthalene-sulfonic Acid (*C. A. nomen.*)  
(*Acetyl-compound used*)



**FORMATION.**—A mixture of 1-naphthylamine-6-(and 7)-sulfonic acids (Cleve's Acids) is acetylated with glacial acetic acid, the excess of acetic acid distilled off, and the acetylated acids dissolved in 5 parts of sulfuric acid. These acids are nitrated with mixed acid containing 43 per cent nitric acid, cooled, diluted with ice and water, and salted out with about 2 parts of salt. The sodium 1-acetamido-4-nitro-6-(and 7)-sulfonates are now reduced hot with iron and some acetic acid. The acetyl-compound is isolated and used as such, the acetyl-group being split off after coupling

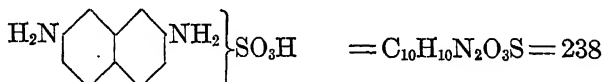
**LITERATURE.**—Cain, *Intermediate Products* (2d Ed.), 210  
Lange, *Zwischenprodukte*, #2486  
Thorpe, *Dic. Chemistry*, 3, 612

**Dyes Derived from 1: 4-Naphthylene-diamine-6-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
273	DISAZO DYE Diaminogen Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	$\alpha$ -Naphthylamine Schaeffer's Acid	D
274	Diaminogen B	I '14:— 313,629 I '20:— 18,120	$\alpha$ -Naphthylamine Gamma Acid	D

**2: 7-Naphthylene-diamine-sulfonic Acid**

2: 7-Diamino-naphthalene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—Probably by first sulfonating the 2:7-dihydroxy-naphthalene and then by action of ammonia on the 2:7-dihydroxy-naphthalene-sulfonic acid

LITERATURE.—Ger. Pat. 79780, 80070; Frdl. 4, 948, 949

Cf. Thorpe, Dic. Chemistry, 3, 610, 611, 650

**Dye Derived from 2:7-Naphthylene-diamine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
330	DISAZO DYE Zambesi Brown G	I '14:— 4,028 I '20:— 1,104	Benzidine Gamma acid	D

***o*-Naphthylene-diamine- $\beta$ -sulfonic Acid**

1:2-Naphthylene-diamine-6-sulfonic Acid (*not considered herein*)

***o*-Naphthylene-diamine- $\gamma$ -sulfonic Acid**

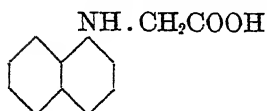
1:2-Naphthylene-diamine-5-sulfonic Acid (*not considered herein*)

***o*-Naphthylene-diamine- $\delta$ -sulfonic Acid**

1:2-Naphthylene-diamine-7-sulfonic Acid (*not considered herein*)

**$\alpha$ -Naphthyl-glycine**

*N*-(1-Naphthyl)-glycine (*C. A. nomen.*)



FORMATION.—From  $\alpha$ -naphthylamine by reaction with chloro-acetic acid

LITERATURE.—Lange, Zwischenprodukte, #2264

Ger. Pat. 79861 of 1893

Dyes Derived from  $\alpha$ -Naphthyl-glycine

<i>Schultz Numbe for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
309	DISAZO DYES Glycine Red		Benzidine Naphthionic Acid	D
310	Glycine Corinth		Benzidene $\alpha$ -Naphthyl-glycine (2 mols)	D

$\beta$ -Naphthyl-sulfuric Acid

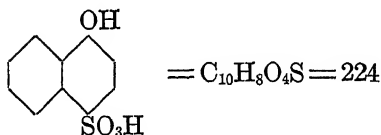
See, 2-Naphthol-1-sulfonic Acid

Nevile-Winther's Acid

1-Naphthol-4-sulfonic Acid (*C. A. nomen.*)

NW Acid

$\alpha$ -Naphthol-sulfonic Acid NW



STATISTICS.—Manufactured '18:—340,074 lbs.

Manufactured '19:—344,449 lbs.

Manufactured '20:—561,929 lbs.

FORMATION.—From the sodium salt of naphthionic acid by hydrolyzing the amino group

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 217

Thorpe, *Dic. Chemistry*, 3, 617

Lange, *Zwischenprodukte*, #2415-2421

## Dyes Derived from Nevile-Winther's Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES			
77	Azo Coccine 2R		Xylidine	A
94	Azo Eosine	I '14:— 1,001 M '18:— ? M '19:— ?	<i>o</i> -Anisidine	A
104	Benzoyl Pink		Benzoyl- <i>o</i> -tolidine	D
163	Azo Rubine	I '14:—230,763 M '17:—197,621 M '18:— 79,779 M '19:—187,264 I '20:— 1,102 M '20:—470,949	Naphthionic Acid	A
176	Double Scarlet S Scarlet 2R	I '14:— 10,182 M '17:— ? I '20:— 1,653	Broenner's Acid	A
194	Rosophenine 10B Thiazine Red R	I '14:— 3,077 M '19:— ? M '20:— ?	Dehydrothio- <i>p</i> -tolui- dine-sulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Primuline	D
	DISAZO DYES			
224	Cloth Red G	I '14:— 401 M '19:— ? M '20:— ?	Amino-azo-benzene	A
233	Cloth Red B	I '14:— 1,962 M '18:— ? M '19:— ? M '20:— ?	Amino-azo-toluene	M
253	Orseilline BB		Amino-azo-toluene-sul- fonic Acid	A

Dyes Derived from Neville Winther's Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
275	Diamond Black F	I '14:—462,306 M '17:— ? M '18:— ? M '19:—222,938 I '20:— 2,226 M '20:— ?	$\alpha$ -Naphthylamine Amino-salicylic Acid	ACr
290	Violet Black		$\alpha$ -Naphthylamine <i>p</i> -Phenylene-diamine or Amino-acet- anilide	D
291	Azo Alizarin Bordeaux W		Salicylic Acid <i>p</i> -Phenylene-diamine	M
312	Congo Corinth	I '14:— 44,157 M '17:— ? M '18:— ? M '19:—137,704 M '20:—242,503	Benzidine Naphthionic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	<i>o</i> -Nitro-benzidine Salicylic Acid	ACr
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Tolidine Naphthionic Acid	D
377	Azo Blue	I '14:— 498 M '19:— ? M '20:— ?	Tolidine Neville-Winther's Acid (2 mols)	D
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Tolidine Chromotropic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	Tolidine J Acid	D

Dyes Derived from Nevile-Winther's Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Tolidine H Acid	D
396	Indazurine RM		Tolidine 1:7-Dihydroxy-2-naph- thoic-4-sulfonic Acid	D
397	Direct Blue R	M '17:— ?	Tolidine 1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid	D
401	Diamine Blue 3R		Ethoxy-benzidine Nevile-Winther's Acid (2 mols)	D
407	Azo Violet		Dianisidine Naphthionic Acid	D
410	Benzoazurine G	I '14:— 78,699 M '18:— ? M '19:— 150,589 I '20:— 287 M '20:— 237,328	Dianisidine Nevile-Winther's Acid (2 mols)	D
412	Congo Blue 2B		Dianisidine R Acid	D
421	Oxamine Blue B	I '14:— 35,891 I '20:— 13	Dianisidine 1-Amino-5-naphthol-7- sulfonic Acid	D
427	Indazurine GM		Dianisidine 1:7-Dihydroxy-2-naph- thoic-4-sulfonic Acid	D
428	Direct Blue B	I '14:— 21,421 M '17:— 14,823 M '18:— ? I '20:— 7,055	Dianisidine 1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid	D

**Dyes Derived from Neville-Winther's Acid** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
447	TRISAZO DYES Benzo Gray S	I '14:— 802	Benzdine Salicylic Acid $\alpha$ -Naphthylamine	D
450	Benzo Black Blue R		Tolidine $\alpha$ -Naphthylamine Nevile-Winther's Acid (2 mols)	D
459	Benzo Black Blue G		Benzdine-disulfonic Acid $\alpha$ -Naphthylamine Nevile-Winther's Acid (2 mols)	D
483	St. Denis Red Rosopenine 4B	I '14:— 1,496 I '20:— 550	Diamino-azoxy-toluene Nevile-Winther's Acid (2 mols)	D
484	Milling Scarlet B		Diamino-azoxy-toluene R Acid	A

**Nigrotic Acid**

*See*, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

**Nigrotinic Acid**

*See*, 1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid

**Nitro-1: 2: 4 Acid**

*See*, 1-Amino-8-nitro-2-naphthol-4-sulfonic Acid

***p*-Nitro-acetanilide**

NH . COCH<sub>3</sub>



= C<sub>8</sub>H<sub>8</sub>N<sub>2</sub>O<sub>3</sub> = 180

STATISTICS.—Manufactured '17:— ?

Manufactured '18:—541,552 lbs.

Manufactured '19:—669,658 lbs.

Manufactured '20:—569,728 lbs.

FORMATION.—Aniline is acetylated to acetanilide, which is dissolved in sulfuric acid and then nitrated with mixed acid in the cold

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 53

USES.—For the manufacture of *p*-nitro-aniline and acetyl-*p*-phenylenediamine (*p*-amino-acetanilide)

### Nitro-alizarin, crude



FORMATION.—Alizarin is dissolved in sulfuric acid and nitrated

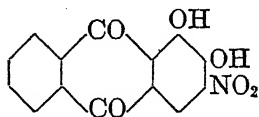
#### Dye Derived from Nitro-alizarin, crude

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
798	ANTHRAQUINONE AND ALLIED DYES Alizarin Maroon W	I '20:— 2,014	[Reduction]	M

### 3-Nitro-alizarin (*C. A. nomen.*)

#### $\beta$ -Nitro-alizarin

#### 1:2-Dihydroxy-3-nitro-anthraquinone



STATISTICS.—Refer to the dye, Alizarin Orange, which is 3-nitro-alizarin

FORMATION.—From alizarin by nitration of its boric ester

LITERATURE.—Schultz, *Farbstofftabellen* (1914), #779

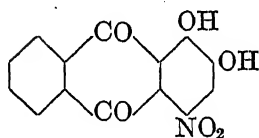
Lange, *Zwischenprodukte*, #3341

Georgievics and Grandmougin, *Dye Chemistry*, 268



## Dyes Derived from 3-Nitro-alizarin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
779	Alizarin Orange	I '14:— 14,239 M '19:— ? I '20:— 500 M '20:— ?	[This is 3-nitro-alizarin]	M
803	Alizarin Blue WX	I '14:—319,394 M '19:— ? I '20:— 5,585	3-Amino-alizarin [Glycerol]	M
804	Alizarin Blue S	I '14:—117,850 I '20:— 43,679	3-Amino-alizarin [Glycerol]	M
808	Alizarin Green X	I '14:—135,191 I '20:— 4,254	3-Amino-alizarin [Glycerol; Oxidation]	M
809	Alizarin Indigo Blue S		3-Amino-alizarin [Glycerol; Oxidation]	M

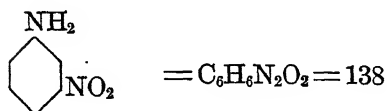
4-Nitro-alizarin (*C. A. nomen.*) $\alpha$ -Nitro-alizarin

FORMATION.—This compound is made by nitration of alizarin in weak oleum solution, or by nitration of the methyl, benzoyl, or arsenic ester of alizarin

LITERATURE.—Georgievics and Grandmougin, *Dye Chemistry*, 268  
Schultz, *Farbstofftabellen* (1914), #779

## Dyes Derived from 4-Nitro-alizarin

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
797	ANTHRAQUINONE AND ALLIED DYES Alizarin Garnet R	I '14:— 720	[Reduction]	M
805	Alizarin Green S	I '14:— 15,885	Nitro-benzene [Reduction; Glycerol]	M

 **$\alpha$ -Nitro-alizarin***See, 4-Nitro-alizarin* **$\beta$ -Nitro-alizarin***See, 3-Nitro-alizarin***6-Nitro-*m*-amino-benzene-sulfonic Acid***See, 6-Nitro-metanilic Acid (C. A. nomen.)****o*-Nitro-*o*-amino-*p*-cresol***See, 2-Amino-6-nitro-*p*-cresol (C. A. nomen. OH = 1)***2-Nitro-6-amino-1-phenol-4-sulfonic Acid***See, 2-Amino-6-nitro-1-phenol-4-sulfonic Acid***6-Nitro-2-amino-1-phenol-4-sulfonic Acid***See, 2-Amino-6-nitro-1-phenol-4-sulfonic Acid****m*-Nitro-aniline**

STATISTICS.—Imported '14:— 3,527 lbs.  
 Manufactured '17:—228,279 lbs.  
 Manufactured '18:—630,802 lbs.  
 Manufactured '19:— 68,600 lbs.  
 Manufactured '20:— ?

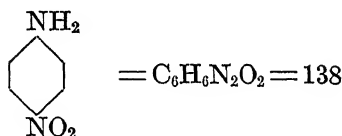
FORMATION.—Benzene is nitrated with mixed acid to dinitro-benzene, and this body is reduced with sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51  
Lange, Zwischenprodukte, #537, 542

Dyes Derived from *m*-Nitro-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
46	MONOAZO DYES <i>m</i> -Nitriline Orange		$\beta$ -Naphthol	MF
47	Orange III	M '18:— ?	R Acid	A
48	Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	Salicylic Acid	M
49	Prague Alizarin Yellow G		$\beta$ -Resorcylic Acid	M
222	DISAZO DYES Janus Yellow G	I '14:— 2,250 I '20:— 758	Resorcinol <i>m</i> -Amino-phenyl-tri-methyl-ammonium Chloride	B
408	Azophor Black S		<i>m</i> -Nitro-aniline (? mols) Dianisidine	D

*p*-Nitro-aniline



STATISTICS.—Imported '14:— 771,682 lbs.  
 Manufactured '17:—1,724,008 lbs.  
 Manufactured '18:—1,320,064 lbs.  
 Manufactured '19:—1,310,658 lbs.  
 Manufactured '20:—2,138,492 lbs.

FORMATION.—(1) Aniline is acetylated to acetanilide, which is then nitrated with mixed acid to *p*-nitro-acetanilide. The latter compound is hydrolyzed by boiling with caustic soda to *p*-nitro-aniline.  
 (2) *p*-Chloro-nitro-benzene is heated with ammonia under pressure

LITERATURE.—Cain, Intermediate Products (2d Ed.), 51  
 Lange, Zwischenprodukte, #533, 538–541

### Dyes Derived from *p*-Nitro-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
50	MONOAZO DYES Azo Cardinal G	M '18:— ?	Ethyl-sulfobenzyl-aniline	A
51	Nitrophenine Thiazol Yellow R	I '14:— 423 M '20:— ?	Dehydrothio-toluidine-sulfonic Acid	D
52	Archil Substitute V		Naphthionic Acid	A
53	Archil Substitute 3VN		Laurent's Acid	A
54	Apollo Red B	I '14:— 904	1-Naphthylamine-4: 6- and -4: 7-disulfonic Acids	A
55	Brilliant Archil C	I '14:— 401 I '20:— 100	1: 8-Naphthylene-dia- mine-3: 6-disulfonic Acid	A
56	Paranitraniline Red	I '14:— 49,847 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	$\beta$ -Naphthol	MF

# DYES CLASSIFIED BY INTERMEDIATES

## Dyes Derived from *p*-Nitro-aniline (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Apparatus Class
	MONOAZO DYES (continued)			
57	Chromotrope 2B	I '14:— 7,970 M '18:— ? M '19:— ? M '20:— ?	Chromotropic Acid	AC
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	Salicylic Acid	M
61	Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:—105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [Reduction]	A
63	Azo Acid Blue B	I '14:— 45,098 I '20:— 4,485	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid [Methylation]	A
215	DISAZO DYES Blue Black N	I '14:— 2,653	Aniline 1-Amino-8-naphthol-4: 6-disulfonic Acid	A
216	Domingo Blue Black B		Aniline 1-Amino-8-naphthol-3: 5-disulfonic Acid	A
217	Naphthol Blue Black Agalma Black 10B	I '14:—431,027 M '17:—620,218 M '18:— 1,158,309 M '19:— 1,877,860 I '20:— 840 M '20:— 2,608,864	Aniline H Acid	A

Dyes Derived from *p*-Nitro-aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
218	DISAZO DYES (continued) Nigrophor B A S F		2: 5-Dichloro-aniline 1-Amino-8-naphthol-5- sulfonic Acid	MF
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid Salicylic Acid	ACr
245	Nyanza Black B		$\alpha$ -Naphthylamine Gamma Acid [ <i>p</i> -Nitro-aniline reduced after coupling]	D
408	Azophor Blue D Azophor Black S		Dianisidine	D
473	TRISAZO DYES Diamine Black HW	I '20:— 342	Benzidine Gamma Acid H Acid	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:— 295,147 M '19:— 305,854 I '20:— 2,460 M '20:— 420,138	Benzidine Phenol H Acid	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:— 136,638 I '20:— 1,332 M '20:— 53,292	Benzidine Salicylic Acid H Acid	D
719	SULFUR DYE Thional Black	I '14:— 16,865	<i>o</i> -Nitro-phenol [Na <sub>2</sub> S plus S] or <i>o</i> -Nitro-phenol (2 mols) Aniline [Na <sub>2</sub> S plus S]	S

**2-Nitro-aniline-4-sulfonic Acid ( $\text{NH}_2 = 1$ )**

*See, 4-Amino-3-nitro-benzene-sulfonic Acid (C. A. nomen.)*

**4-Nitro-aniline-2-sulfonic Acid ( $\text{NH}_2 = 1$ )**

*See, 2-Amino-5-nitro-benzene-sulfonic Acid (C. A. nomen.  
SO<sub>3</sub>H = 1)*

**4-Nitro-aniline-3-sulfonic Acid**

*See, 6-Nitro-metanilic Acid (C. A. nomen.)*

***o*-Nitro-aniline-*p*-sulfonic Acid ( $\text{NH}_2 = 1$ )**

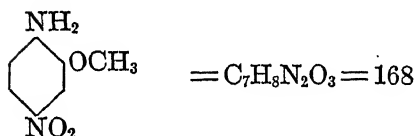
*See, 4-Amino-3-nitro-benzene-sulfonic Acid (C. A. nomen.)*

***p*-Nitro-aniline-*o*-sulfonic Acid ( $\text{NH}_2 = 1$ )**

*See, 2-Amino-5-nitro-benzene-sulfonic Acid (C. A. nomen  
SO<sub>3</sub>H = 1)*

**4-Nitro-*o*-anisidine (C. A. nomen.  $\text{NH}_2 = 1$ )**

*p*-Nitro-*o*-anisidine ( $\text{NH}_2 = 1$ )



**FORMATION.**—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- and 5-nitro-*o*-anisidines, is separated by crystallization from 40 per cent sulfuric acid

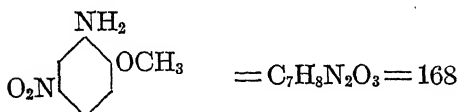
**LITERATURE.**—Lange, Zwischenprodukte, #911

**Dye Derived from 4-Nitro-*o*-anisidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
98	MONOAZO DYES Naphthol Pink Nitrosamine Pink BX	I '14:—	99 $\beta$ -Naphthol	MF

**5-Nitro-*o*-anisidine** (*C. A. nomen.*  $NH_2=1$ )

*m*-Nitro-*o*-anisidine ( $NH_2=1$ )



**FORMATION.**—*o*-Anisidine is acetylated, then nitrated, and saponified by heating with 70 per cent sulfuric acid. The resulting mixture of 4- and 5-nitro-*o*-anisidines is separated by crystallization from 40 per cent sulfuric acid

**LITERATURE.**—Lange, Zwischenprodukte, #911

**Dye Derived from 5-Nitro-*o*-anisidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
99	MONOAZO DYE Tuscaline Orange G		$\beta$ -Naphthol	CL MF

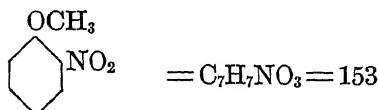
***m*-Nitro-*o*-anisidine** ( $NH_2=1$ )

*See*, 5-Nitro-*o*-anisidine (*C. A. nomen.*  $NH_2=1$ )

***p*-Nitro-*o*-anisidine** ( $NH_2=1$ )

*See*, 4-Nitro-*o*-anisidine (*C. A. nomen.*  $NH_2=1$ )

***o*-Nitro-anisole**



**STATISTICS.**—Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:—273,327 lbs.

**FORMATION.**—(1) From *o*-nitro-phenol by methylation. (2) From *o*-chloro-nitro-benzene by action of methanol (methyl alcohol) and caustic soda

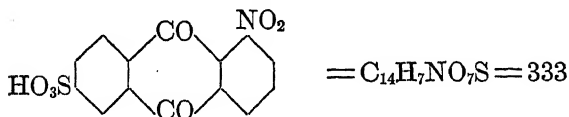


LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 96  
Cf. Lange, *Zwischenprodukte*, #578

USES.—For preparation of dianisidine

**1-Nitro-anthraquinone-6-sulfonic Acid**

5-Nitro-2-anthraquinone-sulfonic Acid (*C. A. nomen.*)



FORMATION.—When anthraquinone-2-sulfonate of sodium is nitrated with a mixture of equal parts of “fuming” nitric acid and sulfuric acid (66°) there arises a mixture of the  $\alpha$ -nitro and  $\beta$ -nitro-anthraquinone-sulfonic acid which can be separated by dilution, whereupon the  $\alpha$ -acid is precipitated. The  $\alpha$ -acid is undoubtedly 1-nitro-anthraquinone-6-sulfonic acid

LITERATURE.—Claus, *Ber.* 15, 1515 (1882)

Cf. Lange, *Zwischenprodukte*, #3160, 3263

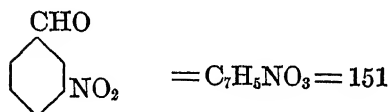
**Dye Derived from 1-Nitro-anthraquinone-6-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
864	ANTHRAQUINONE AND ALLIED DYES Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	Aniline [Halogenation] <i>p</i> -Toluidine	ACr

**5-Nitro-2-anthraquinone-sulfonic Acid (*C. A. nomen.*)**

See, 1-Nitro-anthraquinone-6-sulfonic Acid

***m*-Nitro-benzaldehyde**



STATISTICS.—Imported '14:—very small

Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '20:— ?

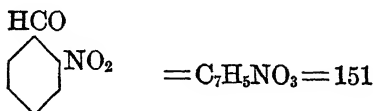
FORMATION.—From benzaldehyde by nitration at not above 30–35°  
(Twenty per cent *o*-nitro-derivative also formed)

LITERATURE.—Cain, Intermediate Products (2d Ed.), 144  
Lange, Zwischenprodukte, #296

### Dyes Derived from *m*-Nitro-benzaldehyde

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
510	TRIPHENYL-METHANE DYES Azo Green		Dimethyl-aniline (2 mols) Salicylic Acid [Oxidation]	M
523	Fast Green	I '14:— 14,347 I '20:— 10,461	Dimethyl-aniline (2 mols) Benzyl Chloride (2 mols) [Sulfonation, Oxidation]	A
543	Patent Blue V	I '14:—196,228 M '17:— ? M '18:— ? I '20:— 36,420	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
544	Cyanine B	I '14:— 8,398 I '20:— 24	Diethyl-aniline (2 mols) [Sulfonation, Oxidation]	A
545	Patent Blue A	I '14:— 63,744 M '18:— ? I '20:— 44,801	Benzyl-ethyl-aniline (2 mols) [Sulfonation, Oxidation]	A

### *o*-Nitro-benzaldehyde



STATISTICS.—Manufactured '18:— ?

FORMATION.—When benzaldehyde is nitrated, there results about 20 per cent of the *o*-nitro- and about 80 per cent of the *m*-nitro-derivative. The nitration product is poured into water, and the oily *o*-derivative is separated from the solid *m*-compound by pressing

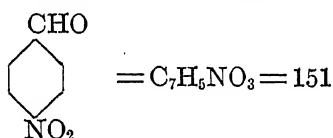
LITERATURE.—Cain, Intermediate Products (2d Ed.), 143

Lange, Zwischenprodukte, 22, 37, 38, 40, 181, 254, 275, 278, 289–302

**Dye Derived from *o*-Nitro-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
875	INDIGO GROUP DYE Indigo Salt T		[Acetone; NaOH]	Print- ing

***p*-Nitro-benzaldehyde**



STATISTICS.—Imported '14:—very small

FORMATION.—From *p*-nitro-toluene by oxidation

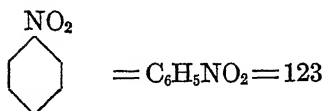
LITERATURE.—Lange, Zwischenprodukte, #275, 303–312

**Dye Derived from *p*-Nitro-benzaldehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
511	TRIPHENYL-METHANE DYE Parafuch sine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (Sulfate) (2 mols) [Zinc chloride; ferrous chloride]	B

## Nitro-benzene

Myrbane Oil



STATISTICS.—Imported '14:— 1,502,205 lbs.

Manufactured '17:—42,975,655 lbs.

Manufactured '18:—38,250,332 lbs.

Manufactured '19:—42,544,017 lbs.

Manufactured '20:—53,244,008 lbs.

FORMATION.—From benzene by nitration with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 20

Lange, Zwischenprodukte, #264-268

## Dyes Derived from Nitro-benzene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
511	TRIPHENYL-METHANE DYES			B
	Parafuchsine	I '14:— 65,026	Aniline (2 mols)	
	Paramagenta	M '18:— ?	<i>p</i> -Toluidine	
		M '19:— ?	or	
512	Magenta Fuchsine	M '20:— ?	<i>p</i> : <i>p</i> '-Diamino-diphenyl- methane or	B
			Anhydro-formalde- hyde-aniline	
			Aniline and aniline hy- drochloride	
			[Ferric chloride]	
		I '14:— 87,102	Aniline	
		M '17:— 17,739	<i>o</i> -Toluidine	
		M '18:— 71,675	<i>p</i> -Toluidine	
		M '19:— 155,830	[Iron and zinc chloride]	
		I '20:— 189		
		M '20:— 284,285		

Dyes Derived from Nitro-benzene (*continued*)

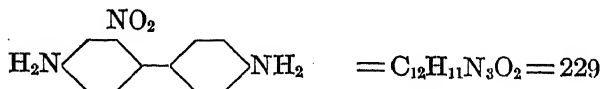
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
698	<p>AZINE DYES</p> <p>Nigrosine, Spirit Soluble</p>	<p>I '14:—186,595</p> <p>M '17:—302,706</p> <p>M '18:—314,151</p> <p>M '19:—346,167</p> <p>M '20:—919,242</p>	<p>Aniline (excess)</p> <p>[Iron]</p>	SS
700	<p>Nigrosine, Water Soluble</p>	<p>I '14:—398,112</p> <p>M '17:—</p> <p>1,968,458</p> <p>M '18:—</p> <p>1,191,343</p> <p>M '19:—</p> <p>1,660,149</p> <p>I '20:— 501</p> <p>M '20:—</p> <p>2,743,021</p>	<p>Aniline (excess)</p> <p>[Iron, Sulfonation]</p>	A
718	<p>SULFUR DYE</p> <p>St. Denis Black</p>		<p><i>p</i>-Phenylene-diamine</p> <p>Phenol</p> <p>[S<sub>2</sub>Cl<sub>2</sub>, S, Na<sub>2</sub>S]</p>	S
805	<p>ANTHRAQUINONE AND ALLIED DYES</p> <p>Alizarin Green S</p>	<p>I '14:— 15,885</p>	<p>4-Amino-alizarin</p> <p>[Reduction; glycerol]</p>	M

**3-Nitro-benzidine** (*C. A. nomen. NH<sub>2</sub>=1*)

*See, o*-Nitro-benzidine

***o*-Nitro-benzidine**

**3-Nitro-benzidine** (*C. A. nomen. NH<sub>2</sub>=1*)



STATISTICS.—Manufactured '19:— ?

FORMATION.—By nitration of benzidine in sulfuric acid solution

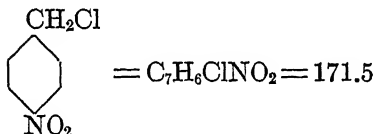
LITERATURE.—Green, Organic Coloring Matters (1908), 41  
 Eng. Pat. 13475 of 1892  
 Lange, Zwischenprodukte, #1220

### Dye Derived from *o*-Nitro-benzidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>
355	DISAZO DYE Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	Salicylic Acid Nevile-Winther's Acid

### *p*-Nitro-benzyl Chloride

$\alpha$ -Chloro-*p*-nitro-toluene (*C. A. nomen.*)



FORMATION.—(1) By passing chlorine into *p*-nitro-toluene heated 185–190°. (2) By dropping benzyl chloride into fuming acid cooled to –15° C.

LITERATURE.—Ann. 185, 271

Ber. 6, 1056

Cf. Lange, Zwischenprodukte, #250

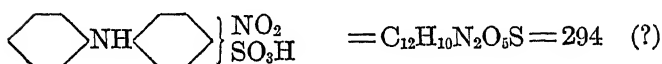
### Dye Derived from *p*-Nitro-benzyl Chloride

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>
734	SULFUR DYE Pyrogene Yellow	I '14:— 18,515 I '20:— 2,701	<i>p</i> -Amino-phenol [S + Na <sub>2</sub> S]

*o*- and *p*-Nitro-chloro-benzenes

See, *o*- and *p*-Chloro-nitro-benzenes (*C. A. nomen.*)

**Nitro-diphenylamine-sulfonic Acid**



**FORMATION.**—Diphenylamine in sulfuric acid solution is heated with 20 per cent oleum at 80–100°, and is then nitrated with nitric acid at 50–80°, resulting in formation of “nitrated diphenylamine-sulfonic acid”

**LITERATURE.**—Lange, *Die Schwefel-farbstoffe*, 145

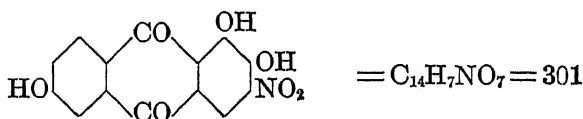
**Dye Derived from Nitro-diphenylamine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
737	SULFUR DYE Cotton Brown Sulfine Brown	I '14:— 2,206	[S+Na <sub>2</sub> S]	S

**3-Nitro-flavopurpurin** (*C. A. nomen.*)

β-Nitro-flavopurpurin

3-Nitro-1:2:6-trihydroxy-anthraquinone



**FORMATION.**—By nitration of flavopurpurin

**LITERATURE.**—Ger. Pat. 54,624, *Frdl.* 2, 122

## Dyes Derived from 3-Nitro-flavopurpurin

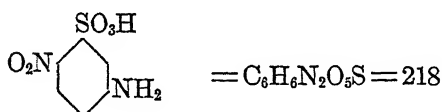
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES			
806	Alizarin Black P	I '14:—229,500	[Glycerol]	M
807	Alizarin Black S	I '14:—259,991	[Glycerol]	M

 $\beta$ -Nitro-flavopurpurin

See, 3-Nitro-flavopurpurin

6-Nitro-metanilic Acid (*C. A. nomen.*)

## 4-Nitro-aniline-3-sulfonic Acid

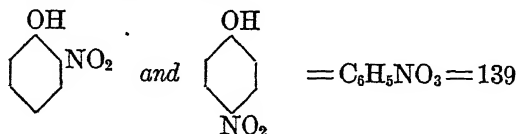
6-Nitro-*m*-amino-benzene-sulfonic Acid

FORMATION.—Sodium metanilate is acetylated, dissolved in sulfuric acid and nitrated with mixed acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 56

USES.—For preparation of nitro-*m*-phenylene-diamine

## Nitro-phenol crude



STATISTICS.—Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:— ?

FORMATION.—From phenol by nitration with nitric acid

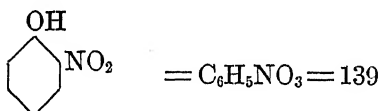
LITERATURE.—Cain, Intermediate Products (2d Ed.), 111



Dyes Derived from Nitro-phenol crude

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
698	AZINE DYES Nigrosine, Spirit Soluble	I '14:—186,595 M '17:—362,706 M '18:—314,151 M '19:—346,167 M '20:—919,242	Aniline (excess)	SS
700	Nigrosine, Water Soluble	I '14:—398,112 M '17:— 1,968,458 M '18:— 1,191,343 M '19:— 1,660,149 I '20:— 501 M '20:— 2,743,021	Aniline (excess) [Sulfonation]	A

*o*-Nitro-phenol



STATISTICS.—Imported '14:—very small

Manufactured '17:— 58,128 lbs.

Manufactured '18:—143,277 lbs.

Manufactured '19:— 18,373 lbs.

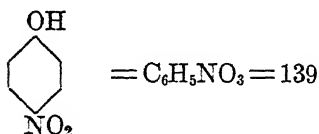
Manufactured '20:— ?

FORMATION.—(1) Phenol is nitrated with nitric acid, resulting in an oily mixture of *o*- and *p*-nitro-phenol. The *o*-derivative is separated by distillation and purified by steam distillation. (2) *o*-Chloro-nitro-benzene is hydrolyzed to the *o*-nitro-phenol by boiling with caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 111  
Lange, Zwischenprodukte, #574–577

Dye Derived from *o*-Nitro-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
719	SULFUR DYE Thional Black	I '14:— 16,865	<i>p</i> -( <i>o</i> - or <i>m</i> -)Nitro- aniline [Na <sub>2</sub> S+S] or <i>p</i> -( <i>o</i> - or <i>m</i> -)Nitro- aniline Aniline <i>o</i> -Nitro-phenol (2 mols) [Na <sub>2</sub> S+S]	S

*p*-Nitro-phenol

STATISTICS.—Imported '14:— 4,780 lbs.

Manufactured '17:—413,216 lbs.

Manufactured '18:—192,259 lbs.

Manufactured '19:— 76,191 lbs.

Manufactured '20:—125,693 lbs.

FORMATION.—(1) Phenol is nitrated with nitric acid to an oily mixture of *o*- and *p*-nitro phenol, from which the *o*-isomer is removed by distillation. The residue upon being extracted with hot water yields the *p*-isomer, which crystallizes out from the aqueous extract upon cooling. (2) *p*-Chloro-nitro-benzene is hydrolyzed to the *p*-nitro-phenol by boiling with caustic soda

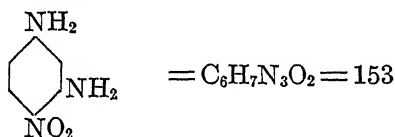
LITERATURE.—Cain, Intermediate Products (2d Ed.), 111

Lange, Zwischenprodukte, #574–576

Dye Derived from *p*-Nitro-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
709	SULFUR DYE Italian Green		[Sulfur, etc.]	S

4-Nitro-*m*-phenylene-diamine

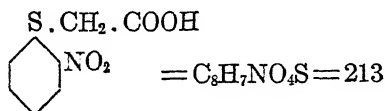


FORMATION.—5-Amino-2-nitro-benzene-sulfonic Acid (4-nitro-aniline-3-sulfonic acid) is heated in an autoclave with 25 per cent ammonia water for three hours at 170–180°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 86

Dyes Derived from 4-Nitro-*m*-phenylene-diamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
191	MONOAZO DYE Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Primuline-sulfonic Acid	D
286	DISAZO DYES Toluylene Yellow	I '14:— 5,485	3:5-Diamino- <i>p</i> -toluene-sulfonic Acid Nitro- <i>m</i> -phenylene-diamine (2 mols)	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Benzidine <i>m</i> -Phenylene-diamine-disulfonic Acid	D
314	Pyramine Orange 2R	I '14:— 2,789	Benzidine Amino-R Acid	D
360	Pyramine Orange R	I '14:— 21,329 I '20:— 7,821	Benzidine-disulfonic Acid Nitro- <i>m</i> -phenylene-diamine (2 mols)	D

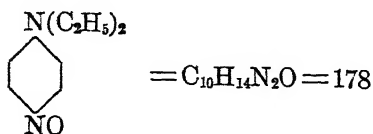
(o-Nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)*See, o-Nitro-phenyl-thioglycolic Acid***o-Nitro-phenyl-thioglycolic Acid**(o-Nitro-phenyl-mercapto)-acetic Acid (*C. A. nomen.*)

FORMATION.—o-Chloro-nitro-benzene in hot alcoholic solution is treated with thioglycolic acid and caustic soda solution, and then boiled for two hours under a reflux condenser

LITERATURE.—Lange, Zwischenprodukte, #611

#### Dye Derived from o-Nitro-phenyl-thioglycolic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
921	INDIGO GROUP DYES Helindone Gray 2B		o-Nitro-phenyl-thioglycolic Acid (2 mols) [Chloro-sulfonic Acid; Reduction]	V

**Nitroso-diethyl-m-amino-phenol***See, 5-Diethylamino-2-nitroso-phenol (C. A. nomen.)***p-Nitroso-diethyl-aniline***N: N-Diethyl-p-nitroso-aniline (C. A. nomen.)*

STATISTICS.—Imported '14:—very small

FORMATION.—From diethyl-aniline by action of nitrous acid

LITERATURE.—Lange, Zwischenprodukte, #531

**Dyes Derived from *p*-Nitroso-diethyl-aniline**

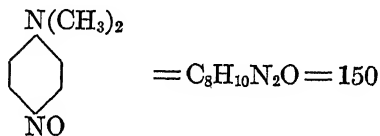
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
639	OXAZINE DYES Gallanilic Violet R, B	I '20:— 100	Gallanilide	M
641	Coreine RR Coelestine Blue B	I '14:— 1,320 I '20:— 44	Gallamide	M
646	Coreine AR		Gallamide Aniline [Sulfonation] or [Coreine RR, Aniline, Sulfonation]	M

**Nitroso-dimethyl-*m*-amino-*p*-cresol**

*See*, 5-Dimethylamino-2-nitroso-*p*-cresol (*C. A. nomen.*)

***p*-Nitroso-dimethyl-aniline**

*N*: *N*-Dimethyl-*p*-nitroso-aniline (*C. A. nomen.*)



STATISTICS.—Manufactured '17:— 96,166 lbs.

Manufactured '18:—851,821 lbs.

Manufactured '19:—592,663 lbs.

Manufactured '20:—155,986 lbs.

FORMATION.—From dimethyl-aniline by action of nitrous acid upon a cold solution of the hydrochloride

LITERATURE.—Lange, Zwischenprodukte, #531

Dyes Derived from *p*-Nitroso-dimethyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
619	INDOPHENOL Indophenol	M '17:— ? M '18:— ? M '19:—126,611 M '20:— ?	$\alpha$ -Naphthol	V
620	OXAZINE AND THIAZINE DYES Capri Blue G O N	I '14:— 128	3-Diethylamino- <i>p</i> - cresol ( <i>OH</i> = 1)	B
622	Delphine Blue B	M '17:— ? M '18:— ? M '19:— 43,827 M '20:— 76,719 I '20:— 29,643	Gallic Acid Aniline [Sulfonation] or [Aniline on Gallocya- nine, Sulfonation]	M
623	Pyrogallol-Cyanine- Sulfonic Acids		Pyrogallol-5-sulfonic Acid	M
624	Modern Violet N	I '20:— 5,688	Gallic Acid [CO <sub>2</sub> removed by heat] or [Gallocyanine heated]	M
626	Gallocyanine	I '14:— 78,253 M '17:— ? M '18:—435,460 M '19:—365,243 I '20:— 12,414 M '20:— 70,169	Gallic Acid	M
627	Modern Cyanine		Gallamide Dimethyl- <i>p</i> -phenylene- diamine [Reduction] or [Gallocyanine; Di- methyl- <i>p</i> -phenylene- diamine; Reduction]	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediate Used and Notes</i>	<i>Dye Appli- cation Class</i>
	OXAZINE AND THIAZINE DYES (continued)			
628	Gallocyanine MS		Gallic Acid [Sulfonation] or [Leuco-gallocyanine sul- fonated; oxidized]	M
629	Gallgreen DH Modern Blue		Gallic Acid [Formaldehyde] or [Formaldehyde on Gallocyanine]	M
630	Cyanazurine		Gallamide Aniline [Reduction]	M
631	Chromocyanine V	M '18:— ? M '19:— ? I '20:— 1,289 M '20:— ?	Gallic Acid [Sulfonation] or [Sulfite on Gallo- cyanine]	M
632	Ultraviolet LGP	I '14:— 4,368	Gallic Acid (2 mols) Nitroso-dimethyl-ani- line (2 mols)	M
633	Indalizarine R	I '20:— 551	Gallic Acid [Sulfonation]	M
634	Indalizarine Green		Gallic Acid [Sulfonation; Nitration] or [Nitration of Indaliza- rine]	M
635	Blue 1900 TC Modern Violet	I '20:— 1,933	Gallic Acid [Reduction]	M
636	Prune	I '14:— 3,197 I '20:— 4,418	Gallic Acid Methyl Ester	M

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	OXAZINE AND THIAZINE DYES ( <i>continued</i> )			
637	Gallamine Blue	I '14:— 2,756 I '20:— 16,446	Gallamide	M
638	Amido Gallamine Blue		Gallamide [Ammonia; Reduction]	M
639	Gallanilic Violet R, B	I '20:— 100	Gallanilide	M
640	Modern Azurine DH		Gallic Acid Methyl Ester Aniline	M
642	Phenocyanine TC	I '20:— 4,740	Gallic Acid Resorcinol	M
643	Phenocyanine TV	M '17:— ? I '20:— 1,543	Gallic Acid Resorcinol [Sulfonation] <i>or</i> [Phenocyanine sulfo- nated]	M
644	Ultracyanine B		Gallic Acid Resorcinol <i>or</i> [Gallocyanine; Resorcinol]	M
645	Gallazine A		Gallic Acid Schaeffer's Acid [Oxidation] <i>or</i> [Gallocyanine, Schaeffer's, Oxidation]	M
647	Nitroso Blue MR Resorcine Blue		Resorcinol	MF



Dyes Derived from *p*-Nitroso-dimethyl-aniline (continued)

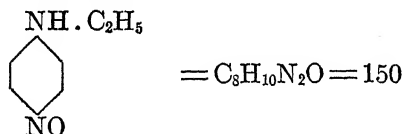
Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Applica- tion Class
	OXAZINE AND THIAZINE DYES (continued)			
649	New Blue R Meldola's Blue Cotton Blue	I '14:— 32,509 M '17:— ? M '18:— 22,613 M '19:— ? I '20:— 5,240 M '20:— ?	$\beta$ -Naphthol	B
650	New Blue B		$\beta$ -Naphthol Nitroso-dimethyl- aniline (2 mols)	B
651	New Methylene Blue GG		$\beta$ -Naphthol [Dimethyl-amine, Oxidation] or [Meldola's Blue, Di- methyl-amine, Oxida- tion]	B
652	New Fast Blue F	I '14:— 2,502	$\beta$ -Naphthol Hydrol or [Meldola's Blue, Hydrol]	B
655	Muscarine		2: 7-Dihydroxy-naph- thalene	B
658	Fast Black	I '14:— 1,960 I '20:— 2,883	<i>m</i> -Hydroxy-diphenyl- amine	B
659	Methylene Blue	I '14:—185,958 M '17:—268,435 M '18:—312,572 M '19:—465,992 I '20:— 2,053 M '20:—577,264	Dimethyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B
660	Methylene Green O	I '14:— 30,812 M '18:— ? M '19:— 2,435 I '20:— 1,047	Dimethyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> etc.; Nitration] or [Methylene Blue nitrated]	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	OXAZINE AND THIAZINE DYES (continued)			
661	Thionine Blue GO	I '14:— 18,618 I '20:— 2,030	Ethyl-methyl-aniline [Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> , etc.]	B
	AZINE DYES			
670	Neutral Red	M '18:— ?	<i>m</i> -Tolylene-diamine [Oxidation]	B
676	Neutral Blue	I '14:— 615	<i>N</i> -Phenyl- $\beta$ -naphthyl- amine	B
677	Basle Blue R		<i>N</i> : <i>N'</i> -Ditolyl-2: 7- naphthylene-diamine	B
678	Fast Neutral Violet B	M '17:— ?	<i>N</i> : <i>N'</i> -Diethyl- <i>m</i> - phenylene-diamine	B
681	Methylene Gray O New Fast Gray	I '14:— 29,507 M '17:— ? M '18:— 16,746 M '19:— 28,458 I '20:— 9 M '20:— 31,620	[Boiling with alcohol]	B
682	Nigramine		Aniline	B
684	Rhoduline Violet	I '14:— 2,751 I '20:— 35	<i>N</i> <sup>1</sup> -Phenyl-4- <i>m</i> -tolyl- lene-diamine or <i>N</i> <sup>3</sup> -Benzyl- <i>N</i> <sup>1</sup> -phenyl-4- <i>m</i> -tolylene-diamine	B
685	Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Xylidine	B
689	Indazine M		Nitroso-dimethyl-ani- line (1 and 2 mols) Diphenyl- <i>m</i> -phenylene- diamine	B

Dyes Derived from *p*-Nitroso-dimethyl-aniline (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	AZINE DYES ( <i>continued</i> )			
691	Metaphenylene Blue B	I '14:— 50	<i>N</i> : <i>N'</i> -Di- <i>o</i> -tolyl- <i>m</i> -phenylene-diamine	B
692	Naphthazine Blue	I '14:— 6,261 I '20:— 2,249	<i>N</i> : <i>N'</i> -Di-2-naphthyl- <i>m</i> -phenylene-diamine [Sulfonation]	A
703	Rubramine		<i>o</i> -Toluidine <i>p</i> -Toluidine	B
704	Indamine 3R		<i>o</i> -Toluidine	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	<i>o</i> -Toluidine <i>p</i> -Toluidine	B

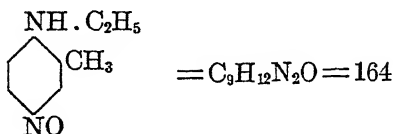
*p*-Nitroso-ethyl-aniline*N*-Ethyl-*p*-nitroso-aniline (*C. A. nomen.*)

FORMATION.—From ethyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

LITERATURE.—*Cf.* Lange, Zwischenprodukte, #529

Dye Derived from *p*-Nitroso-ethyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
684	AZINE DYE Rhoduline Red B		<i>N</i> <sup>1</sup> -Phenyl-4- <i>m</i> -tolylene-diamine or <i>N</i> <sup>3</sup> -Benzyl- <i>N</i> <sup>1</sup> -phenyl-4- <i>m</i> -tolylene-diamine	B

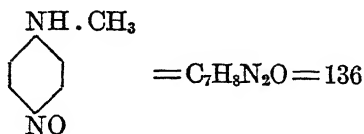
***p*-Nitroso-ethyl-*o*-toluidine***N*-Ethyl-4-nitroso-*o*-toluidine (*C. A. nomen. NHR* = 1)

**FORMATION.**—From ethyl-*o*-toluidine in an alcoholic solution of hydrochloric acid, by action of  $\text{NaNO}_2$  solution in the cold

**LITERATURE.**—Beilstein, *Organische Chemie* (3d aufl.), II, spl., 248  
*Cf. Lange, Zwischenprodukte, #529*

**Dyes Derived from Nitroso-ethyl-*o*-toluidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
684	AZINE DYES Rhoduline Red G		<i>N</i> <sup>1</sup> -Phenyl-4- <i>m</i> -tolylene-diamine or <i>N</i> <sup>3</sup> -Benzyl- <i>N</i> <sup>1</sup> -phenyl-4- <i>m</i> -tolylene-diamine	B
684	Brilliant Rhoduline Red		<i>N</i> <sup>3</sup> -Ethyl- <i>N</i> <sup>1</sup> -phenyl-4- <i>m</i> -tolylene-diamine	B

***p*-Nitroso-methyl-aniline***N*-Methyl-*p*-nitroso-aniline (*C. A. nomen.*)

**FORMATION.**—From methyl-aniline by action of nitrous acid on the solution in strong alcoholic hydrochloric acid

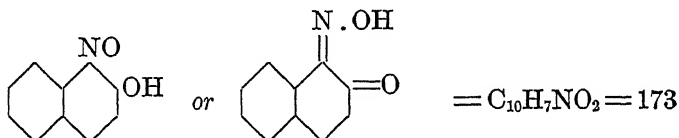
**LITERATURE.**—Lange, *Zwischenprodukte, #529*

Dye Derived from *p*-Nitroso-methyl-aniline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
625	OXAZINE DYE Chrome Heliotrope		Gallic Acid [Reduction]	M

1-Nitroso-2-naphthol (*C. A. nomen.*)

$\alpha$ -Nitroso- $\beta$ -naphthol



STATISTICS.—Manufactured in 1918 and 1919, but in undisclosed quantities

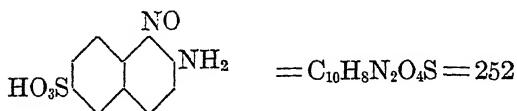
FORMATION.—From  $\beta$ -naphthol by action of nitrous acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 216  
Lange, *Zwischenprodukte*, #2330

Dyes Derived from 1-Nitroso-2-naphthol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
2	NITROSO DYE Gambine Y		[This is 1-Nitroso-2-naphthol]	M
107	MONOAZO DYES Sulfamine Brown A	I '14:— 132 M '18:— ? M '19:— ? I '20:— 2,630 M '20:— ?	$\alpha$ -Naphthylamine	M
116	Sulfamine Brown B		$\beta$ -Naphthylamine	M
331	DISAZO DYES Alkali Dark Brown GV		Benzidine Gamma Acid	D

## 1-Nitroso-2-naphthylamine-6-sulfonic Acid

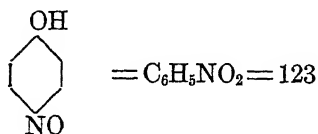
6-Amino-5-nitroso-2-naphthalene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—One part of 1-nitroso-2-naphthol-6-sulfonic acid (nitroso-Schaeffer's Acid) is heated with one part of 25 per cent ammonia for three hours at 60°

LITERATURE.—Lange, *Zwischenprodukte*, #2479

## Dye Derived from 1-Nitroso-2-naphthylamine-6-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
675	AZINE DYE Rosinduline G		Aniline (2 mols)	A

*p*-Nitroso-phenol

STATISTICS.—Imported '14:—very small amount

Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:—155,273

Manufactured '20:—167,855

FORMATION.—From phenol by action of nitrous acid in the cold

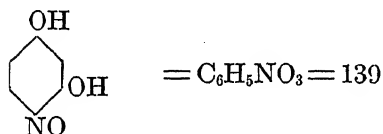
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 111

Lange, *Zwischenprodukte*, 573

Dye Derived from *p*-Nitroso-phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
748	SULFUR DYE Hydron Blue	I '14:—296,723 I '20:— 19,210 M '20:— ?	Carbazole [S+Na <sub>2</sub> S]	V

4-Nitroso-resorcinol



FORMATION.—Resorcinol is dissolved in alcohol, one molecule of caustic soda added, and then gradually one molecule of isoamyl nitrite is introduced with cooling

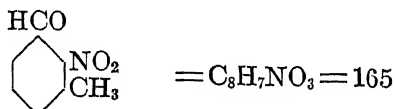
LITERATURE.—Beilstein, *Organische Chemie* (3d Ed.), II, 923

Dye Derived from 4-Nitroso-resorcinol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
648	OXAZINE DYE Iris Blue		Resorcinol [Bromination]	A

2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

*o*-Nitro-tolylaldehyde



FORMATION.—*m*-Tolylaldehyde is nitrated, and then the two isomeric nitro-compounds separated by distillation under reduced pressure

LITERATURE.—Lange, Zwischenprodukte, #758, 759

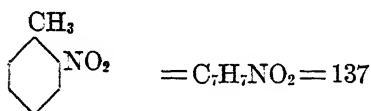
Ger. Pat. 113,604 Frdl. 6, 128

**Dye Derived from 2-Nitro-*m*-tolualdehyde**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
SSS	INDIGO GROUP DYE Indigo MLB/T	I '14:— 10,730 I '20:— 827	2-Nitro- <i>m</i> -tolualdehyde (2 mols) [Acetone, NaOH]	V

***o*-Nitro-toluene** (*C. A. nomen.*)

*o*-Nitro-toluol



STATISTICS.—Imported '14:— 42,482 lbs.

Manufactured '17:—1,002,822 lbs.

Manufactured '18:—1,240,499 lbs.

Manufactured '19:—1,366,599 lbs.

Manufactured '20:—2,173,279 lbs.

FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o*- and *p*-nitro-toluenes. The separation is effected by means of fractional distillation and freezing—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32

Lange, Zwischenprodukte, #230–233

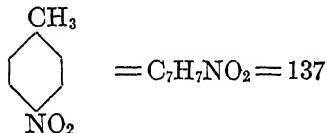


Dyes Derived from *o*-Nitro-toluene

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
513	TRIPHENYL-METHANE DYE New Fuchsine O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde- <i>o</i> -toluidine or Diamino- <i>o</i> -di- tolyl-methane <i>o</i> -Toluidine	B

*p*-Nitro-toluene (*C. A. nomen.*)

*p*-Nitro-toluol



STATISTICS.—Imported '14:—very small

Manufactured '17:—567,314 lbs.

Manufactured '18:—670,645 lbs.

Manufactured '19:—1,263,056 lbs.

Manufactured '20:—2,004,089 lbs.

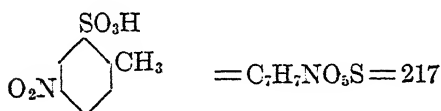
FORMATION.—Toluene is nitrated with mixed nitric and sulfuric acids to a mixture of *o*- and *p*-nitro-toluene. The separation is effected by means of fractional distillation and freezing,—the *o*-isomer being distilled off and the *p*-body separated as a solid by cooling the still residue

LITERATURE.—Cain, Intermediate Products (2d Ed.), 32

Lange, Zwischenprodukte, #230-233

Dye Derived from *p*-Nitro-toluene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
498	TRIPHENYL-METHANE DYE Turquoise Blue	I '14:— 1,541 I '20:— 1,407	Hydrol or 4: 4'-Tetraethyl- diamino-benzohydrol	B

5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen.*  $SO_3H = 1$ )*p*-Nitro-toluene-*o*-sulfonic Acid ( $CH_3 = 1$ )

STATISTICS.—Manufactured '20:— ?

FORMATION.—From *p*-nitro-toluene by sulfonation with oleumLITERATURE.—Cain, *Intermediate Products* (2d Ed.), 34Lange, *Zwischenprodukte*, #837Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid

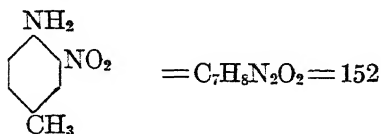
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
9	STILBENE DYES Sun Yellow Direct Yellow R	I '14:—232,688 M '17:—420,685 M '18:—307,702 M '19:—440,924 I '20:— 1,404 M '20:—348,849	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (4 mols) [Alkalies]	D
10	Mikado Yellow Stilbene Yellow	I '14:— 85,795 M '18:— ? M '19:— ?	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (4 mols) [Alkalies; Oxidation]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	STILBENE DYES ( <i>continued</i> )			
11	Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (4 mols) [Alkalies; Oxidation]	D
12	Diphenyl Citronine G		<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) Aniline (2 mols)	D
13	Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) <i>p</i> -Phenylene-diamine (2 mols)	D
14	Diphenyl Chrysoine	I '14:— 9,898	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) <i>p</i> -Amino-phenol (2 mols) [Ethylation]	D
15	Chicago Orange G		Benzidine	D
16	Curcuphenine		<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (4 mols) Dehydro-thio- <i>p</i> -tolui- dine-sulfonic Acid (2 mols)	D
17	Chlorophenine		<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (4 mols) Dehydro-thio- <i>p</i> -tolui- dine-sulfonic Acid (2 mols) [Reduction]	D

Dyes Derived from 5-Nitro-*o*-toluene-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
205	MONOAZO DYES Diphenyl Chrysoine RR		<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) <i>p</i> -Phenylene-diamine (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) <i>p</i> -Phenylene-diamine (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) <i>p</i> -Phenylene-diamine (2 mols) Phenyl-gamma Acid	D

*p*-Nitro-toluene-*o*-sulfonic Acid ( $CH_3=1$ )*See*, 5-Nitro-*o*-toluene-sulfonic Acid (*C. A. nomen.*  $SO_3H=1$ )2-Nitro-*p*-toluidine (*C. A. nomen.*  $NH_2=1$ )*m*-Nitro-*p*-toluidine ( $CH_3=1$ )

STATISTICS.—Imported '14:—10,513 lbs.

Manufactured '17:— ?

Manufactured '18:—24,415 lbs.

Manufactured '19:—58,454 lbs.

Manufactured '20:—71,197 lbs.

FORMATION.—From acetyl-*p*-toluidine by nitration

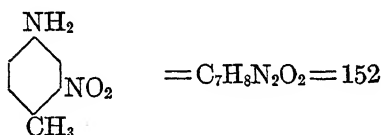
LITERATURE.—Cain, Intermediate Products (2d Ed.), 58  
Lange, Zwischenprodukte, #790

**Dye Derived from 2-Nitro-*p*-toluidine ( $NH_2=1$ )**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
73	<p>MONOAZO DYE</p> <p>Pigment Fast</p> <p>Red HL</p> <p>Lithol Fast Red RL</p> <p>Lithol Fast Scarlet</p>	<p>I '14:— 49,708</p> <p>M '17:— ?</p> <p>M '18:— ?</p> <p>M '19:— ?</p> <p>I '20:— 1,001</p> <p>M '20:— ?</p>	$\beta$ -Naphthol	CL

**3-Nitro-*p*-toluidine** (*C. A. nomen.*  $NH_2=1$ )

*o*-Nitro-*p*-toluidine ( $CH_3=1$ )



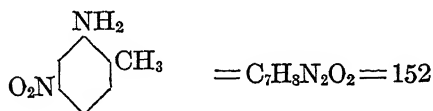
STATISTICS.—20,737 lbs. imported in fiscal year 1914

FORMATION.—From dinitro-toluene by partial reduction, using iron and sulfur dioxide

LITERATURE.—Lange, Zwischenprodukte, #536, 539, 790, 791

**5-Nitro-*o*-toluidine** (*C. A. nomen.*  $NH_2=1$ )

*p*-Nitro-*o*-toluidine ( $CH_3=1$ )



STATISTICS.—Imported '14:—30,642 lbs.

Manufactured '20:— ?

FORMATION.—From *o*-toluidine by nitration

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 58  
Lange, *Zwischenprodukte*, #790

**Dyes Derived from 5-Nitro-*o*-toluidine ( $NH_2=1$ )**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
8	NITRO DYE Pigment Chlorine	M '19:— ? M '20:— ?	5-Nitro- <i>o</i> -toluidine (2 mols)	CL
72	MONOAZO DYE Pigment Orange R		$\beta$ -Naphthol	CL MF

***m*-Nitro-*p*-toluidine ( $CH_3=1$ )**

*See*, 2-Nitro-*p*-toluidine (*C. A. nomen.*  $NH_2=1$ )

***o*-Nitro-*p*-toluidine ( $CH_3=1$ )**

*See*, 3-Nitro-*p*-toluidine (*C. A. nomen.*  $NH_2=1$ )

***p*-Nitro-*o*-toluidine ( $CH_3=1$ )**

*See*, 5-Nitro-*o*-toluidine (*C. A. nomen.*  $NH_2=1$ )

***o*-Nitro-toluol**

*See*, *o*-Nitro-toluene (*C. A. nomen.*)

***p*-Nitro-toluol**

*See*, *p*-Nitro-toluene (*C. A. nomen.*)

***o*-Nitro-tolylaldehyde**

*See*, 2-Nitro-*m*-tolualdehyde (*C. A. nomen.*)

**3-Nitro-1:2:6-trihydroxy-anthraquinone**

*See*, 3-Nitro-flavopurpurin (*C. A. nomen.*)

**NW Acid**

*See*, Nevile-Winther's Acid

**Ortho = o**

*Note.*—This is not considered in the alphabetical arrangement, e.g., *ortho-Toluidine* is indexed as *o-Toluidine* under "T." However, *o-Toluidine* precedes *p-Toluidine*

**Oxy-compounds**

*See*, Hydroxy-compounds

**Oxy-juglone**

*See*, Naphthazarin

 **$\alpha$ -Oxy-naphthoic Acid**

*See*, 1-Hydroxy-2-naphthoic Acid

 **$\beta$ -Oxy-naphthoic Acid**

*See*, 3-Hydroxy-2-naphthoic Acid

 **$\alpha$ -Oxy-naphthoic-sulfonic Acid**

1-Hydroxy-2-naphthoic-4-sulfonic Acid (*not considered herein*)

 **$\beta$ -Oxy-naphthoic-sulfonic Acid L**

2-Hydroxy-3-naphthoic-6-sulfonic Acid (*not considered herein*)

 **$\beta$ -Oxy-naphthoic-sulfonic Acid S**

2-Hydroxy-3-naphthoic-8-sulfonic Acid (*not considered herein*)

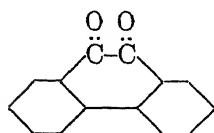
**Para = p**

*Note.*—This is not considered in the alphabetical arrangement, e.g., *para-Nitro-aniline* is indexed as *p-Nitro-aniline* under "N." However, *p-Nitro-aniline* follows *m-Nitro-aniline*

**Peri Acid***See*, 1-Naphthylamine-8-sulfonic Acid**Peri-naphthylene-diamine**1: 8-Naphthylene-diamine (*not considered herein*)**Phenanthraquinone***See*, Phenanthrene-quinone**Phenanthrene-quinone** (*C. A. nomen.*)

9: 10-Dihydro-9: 10-diketo-phenanthrene

Phenanthraquinone



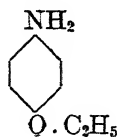
FORMATION.—From phenanthrene by oxidation with sodium bichromate and sulfuric acid

LITERATURE.—Lange, *Zwischenprodukte*, #648

Green, *Organic Coloring Matters* (1908), 65

**Dye Derived from Phenanthrene-quinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
668	AZINE DYE Flavinduline O	I '14:— 660	<i>o</i> -Amino-diphenyl-amine	B

**Phenanthroquinolinone** (*C. A. nomen.*)*See*, Benzanthrone-quinoline***p*-Phenetidine** (*C. A. nomen.*)*p*-Amino-phenol Ethyl Ether



STATISTICS.—Imported '14:—125,524 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '19:— ?

FORMATION.—From *p*-amino-phenol by ethylation of the hydroxyl.  
 Before ethylation the amino group is protected; for example, by forming the benzylidene compound by treatment of the *p*-amino-phenol with benzaldehyde

LITERATURE.—Lange, Zwischenprodukte, #590

**Dye Derived from *p*-Phenetidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
584	XANTHONE DYE Fast Acid Blue R	I '14:— 4,022 I '20:— 130	<i>p</i> -Phenetidine (2 mols) 3: 6-Dichloro-phthalic Anhydride Resorcinol (2 mols) [PCl <sub>5</sub> ; Sulfonation]	A

**Phenol** (*C. A. nomen.*)

Carbolic Acid



STATISTICS.—Imported '14:— 10,108,781 lbs.  
 Manufactured '17:— 64,146,499 lbs.  
 Manufactured '18:—106,794,277 lbs.  
 Manufactured '19:— 1,543,659 lbs.  
 Manufactured '20:— ?

FORMATION.—(1) By distillation from coal tar. (2) By synthesis from benzene, in which case the benzene is sulfonated to benzene-sulfonic acid, which is then fused with caustic soda

LITERATURE.—Cain, Intermediate Products, 104  
 Lange, Zwischenprodukte, #142-145

## Dyes Derived from Phenol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
5	NITRO DYE Picric Acid	M'19:— ? M'20:— ?		B
125	MONOAZO DYES Diazine Black	I '14:— 2,630 I '20:— 701	<i>p</i> -Tolylene-diamine <i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine or [Safranine]	B
205	Diphenyl Chrysoine RR		<i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid <i>p</i> -Phenylene-diamine	D
303	DISAZO DYES Brilliant Yellow Paper Yellow	I '14:—278,000 M'17:— ? M'18:— 1,664 M'19:— 48,723 I '20:— 126 M'20:— 91,218	Diamino-stilbene- disulfonic Acid Phenol (2 mols)	D A
304	Chrysophenine G	I '14:—157,799 M'17:— ? M'18:— 41,663 M'19:— 86,795 I '20:— 3,661 M'20:—247,202	Diamino-stilbene-disul- fonic Acid Phenol (2 mols) [Ethylation]	D
315	Congo Orange G	I '14:— 1,623 I '20:— 75	Benzidine Amino-R Acid [Ethylation]	D
319	Diamine Scarlet B	I '14:— 41,175 I '20:— 10,565	Benzidine G Acid	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Tolidine Amino-R Acid [Ethylation]	D

Dyes Derived from Phenol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Salicylic Acid [Ethylation]	D
431	Diamine Golden Yellow		1:5-Naphthylene-dia- mine-3:7-disulfonic Acid Phenol (2 mols) [Ethylation]	D
	TRISAZO DYES			
464	Erie Direct Green ET	M '17:— ? M '18:— ? M '19:— 69,700 M '20:— ?	Benzidine H Acid Aniline	D
467	Diphenyl Green G	I '20:— 2,205	Benzidine H Acid o-Chloro-p-nitro- aniline	D
470	Chloramine Green B	I '14:— 1,675 M '19:— ? M '20:— ?	Benzidine H Acid 2:5-Dichloro-aniline	D
474	Diamine Green B Oxamine Green B	I '14:— 77,100 M '17:— ? M '18:— 295,147 M '19:— 305,854 I '20:— 2,460 M '20:— 420,138	Benzidine H Acid p-Nitro-aniline	D
	TRIPHENYL-METHANE DYES			
515	Methyl Violet	I '14:— 255,063 M '17:— 375,107 M '18:— 632,196 M '19:— 574,436 I '20:— 3,312 M '20:— 600,873	Dimethyl-aniline (3 mols)	B

Dyes Derived from Phenol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
517	Methyl Violet 5B Benzyl Violet	I '14:— 22,387 M '17:— ? I '20:— 3,313	[Benzylation of Methyl Violet] <i>or</i> Dimethyl-aniline (3 mols) Benzyl Chloride	B
519	Methyl Green		[Methyl Chloride of Methyl Violet] <i>or</i> Dimethyl-aniline (3 mols) [Methyl Chloride]	B
555	Aurine	I '14:— 784 M '18:— ? I '20:— 336	Phenol (3 mols) [Heated with oxalic and sulfuric acids]	ss CL
556	Red Coralline		[Aurine treated with ammonia] <i>or</i> Phenol (3 mols) [Heated with oxalic and sulfuric acid; treated with ammonia]	CL
693	AZINE DYE Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl- $\alpha$ -naphthyl- amine (2 mols) [Sulfonation]	M
718	SULFUR DYES St. Denis Black B		<i>p</i> -Phenylene-diamine Nitro-benzene [S <sub>2</sub> Cl <sub>2</sub> , S, Na <sub>2</sub> S]	S

Dyes Derived from Phenol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
732	SULFUR DYES ( <i>continued</i> ) Autogene Black	I '14:— 7,495	4-Amino-4'-hydroxy- diphenylamine or 2: 4-Diamino-4'-hy- droxy-diphenylamine [S <sub>2</sub> Cl <sub>2</sub> ; S+Na <sub>2</sub> S]	S
775	ANTHRAQUINONE AND ALLIED DYES Alizarin Dark Green W		Naphthazarin or Dinitro-naphthalene	M

Phenyl-*p*-amino-benzyl-*o*-toluidine (CH<sub>3</sub>=1)

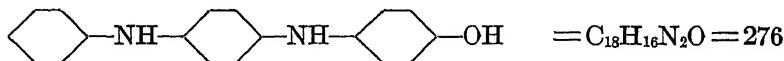
*See*, N<sup>3</sup>-Benzyl-N<sup>1</sup>-phenyl-4-*m*-tolylene-diamine (NH<sub>2</sub>=1)

Phenyl-*p*-amino-ethyl-*o*-toluidine (CH<sub>3</sub>=1)

*See*, N<sup>3</sup>-Ethyl-N<sup>1</sup>-phenyl-4-*m*-tolylene-diamine (NH<sub>2</sub>=1)

4-Phenylamino-4'-hydroxy-diphenylamine

*p*-(*p*-Anilino-anilino)-*p*henol (C. A. nomen.)

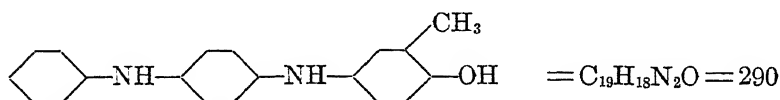


FORMATION.—(1) From *p*-amino-diphenylamine and phenol by oxidation in acid solution and then reduction of the indophenol.  
(2) From diphenylamine and *p*-amino-phenol (*p*-nitroso-phenol) by oxidation and then reduction of the indophenol

LITERATURE.—Cain, Intermediate Products (2d Ed.), 76  
Lange, Zwischenprodukte, #1721  
Lange, Schwefelfarbstoffe, 161

**Dye Derived from 4-Phenylamino-4'-hydroxy-diphenylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na <sub>2</sub> S]	S

**4-Phenylamino-4'-hydroxy-(phenyl-3'-tolylamine)**4-(*p*-Anilino-anilino)-*o*-cresol (*C. A. nomen. OH = 1*)

FORMATION.—From *p*-amino-diphenylamine and *o*-cresol by oxidation and subsequent reduction of the indophenol formed

LITERATURE.—Lange, Zwischenprodukte, #1721

**Dye Derived from 4-Phenylamino-4'-hydroxy-(phenyl-3'-tolylamine)**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
735	SULFUR DYE Pyrogene Indigo	I '14:— 22,661	[S+Na <sub>2</sub> S]	S

**2-Phenylamino-8-naphthol-6-sulfonic Acid**

*See, Phenyl-gamma Acid*

**Phenyl-*m*-amino-phenol**

*See, m*-Hydroxy-diphenylamine

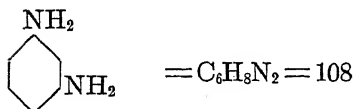
**Phenyl-*p*-amino-*o*-toluidine**

*See, N*<sup>1</sup>-Phenyl-4-*m*-tolylene-diamine

**Phenyl-azo-aniline** (*C. A. nomen.*)

*See*, Amino-azo-benzene

***m*-Phenylene-diamine**



STATISTICS.—Manufactured '17:—220,956 lbs.

Manufactured '18:—641,299 lbs.

Manufactured '19:—609,789 lbs.

Manufactured '20:—658,313 lbs.

FORMATION.—From *m*-dinitro-benzene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 85

Lange, Zwischenprodukte, #550

**Dyes Derived from *m*-Phenylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
33	MONOAZO DYES Chrysoidine Y	I '14:— 63,303 M '17:—195,756 M '18:—376,495 M '19:—314,581 M '20:—585,648	Aniline	B
88	Acid Anthracene Brown R	I '14:— 33,053 M '17:— ? M '19:— ? I' 20:— 1,400 M '20:— ?	Picramic Acid [Substituted phenylene- diamine-sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M '17:— ? M '18:—349,961 M '19:— ? M '20:—192,914	Picramic Acid	M

Dyes Derived from *m*-Phenylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
154	Acid Alizarine Brown B Palatine Chrome Brown W	I '14:— 18,264 M '17:— ? M '18:— ? M '19:— ? I '20:— 845 M '20:— ?	<i>o</i> -Amino-phenol- <i>p</i> - sulfonic Acid	M
190	Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	Dehydro-thio- <i>p</i> -tolui- dine-sulfonic Acid or Primuline	D
	DISAZO DYES			
208	Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	<i>p</i> -Phenylene-diamine (2 mols)	B
209	Terracotta FC	I '14:— 551	Primuline or Dehydro- thio- <i>p</i> -toluidine- sulfonic Acid Naphthionic Acid	D
239	Azotol C		<i>p</i> -Amino-acetanilide $\beta$ -Naphthol	MF
283	Bismarck Brown	I '14:— 35,020 M '17:— 309,857 M '18:— 378,208 M '19:— 412,574 M '20:— 514,218	<i>m</i> -Phenylene-diamine (3 mols)	B
285	Toluylene Brown G		3:5-Diamino- <i>p</i> -toluene- sulfonic Acid	D
329	Diamine Brown V	M '19:— ?	Benzidine Gamma Acid	D



Dyes Derived from *m*-Phenylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
435	TRISAZO DYES Janus Brown B		Trimethyl- <i>m</i> -amino- phenyl-ammonium Chloride or <i>p</i> -Amino-benzyl-di- ethylamine $\alpha$ -Naphthylamine or <i>m</i> -Toluidine Aniline	B
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- <i>and</i> 7-sulfonic Acids <i>p</i> -Phenylene-diamine Gamma Acid	D
437	Isodiphenyl Black R		<i>p</i> -Phenylene-diamine Gamma Acid Resorcinol	D
448	Diamine Bronze G	I '14:— 4,449	Benzidine Salicylic Acid H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid 2R Acid	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid 2R Acid	D
457	Trisulfon Brown GG	I '14 — 7,562 I '20:— 38,411	Dianisidine Salicylic Acid 2R Acid	D

Dyes Derived from *m*-Phenylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
45S	TRISAZO DYES (continued) Carbon Black		<i>p</i> -Phenylene-diamine- sulfonic Acid (from <i>p</i> - nitro-aniline- <i>o</i> -sul- fonic Acid) 1-Naphthylamine-6(7)- sulfonic Acid <i>m</i> -Phenylene-diamine (2 mols)	D
461	Coomassie Union Black		1:4-Naphthylene-dia- mine-2-sulfonic Acid Gamma Acid <i>m</i> -Phenylene-diamine (2 mols)	D
462	Erie Direct Black GX Direct Deep Black EW	I '14:— 1,246,536 M '17:— ? M '18:— ? M '19:— 7,250,007 M '20:— 7,736,994	Benzidine Aniline H Acid	D
469	Chloramine Black N	I '14:— 39,600 M '19:— ? I '20:— 1,763 M '20:— ?	Benzidine H Acid 2:5-Dichloro-aniline	D
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:— 623,757	Benzidine Sulfanilic Acid Salicylic Acid	D
479	Dianil Black R		Benzidine Naphthionic Acid Chromotropic Acid	D

Dyes Derived from *m*-Phenylene-diamine (continued)

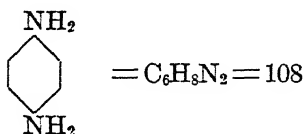
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
485	TETRAKISAZO DYES Benzo Brown G	I '14:— 41,905 M '17:— ? M '18:— ? M '19:— 83,506 I '20:— 2,286 M '20:—109,648	Sulfanilic Acid (2 mols) <i>m</i> -Phenylene-diamine (3 mols)	D
486	Direct Brown J	I '14:— 3,640	<i>m</i> -Amino-benzoic Acid (2 mols) <i>m</i> -Phenylene-diamine (3 mols)	D
487	Benzo Brown B	I '14:— 438 M '20:— ?	Naphthionic Acid (2 mols) <i>m</i> -Phenylene-diamine (3 mols)	D
488	Toluylene Brown R	I '14:— 201	Naphthionic Acid (2 mols) 3:5-Diamino- <i>p</i> -toluene- sulfonic Acid <i>m</i> -Phenylene-diamine (2 mols)	D
490	Cotton Brown A	I '14:— 29,074	Benzydine Naphthionic Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D
491	Dianil Black PR		Benzydine-sulfonic Acid Gamma Acid (2 mols) <i>m</i> -Phenylene-diamine (2 mols)	D
492	Anthracene Acid Brown B		Amino-salicylic Acid (2 mols) 1-Naphthylamine-6-sul- fonic Acid (2 mols)	M ACr

Dyes Derived from *m*-Phenylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
607	ACRIDINE DYE Rheonine	I '14:— 19,704	Ketone	B
669	AZINE DYE Neutral Violet		Dimethyl- <i>p</i> -phenylene- diamine (2 mols) [Oxidation]	

*p*-Phenylene-diamine

*Note.*—In a number of cases where *p*-phenylene-diamine was apparently used, actually its acetyl-derivative *p*-amino-acetanilide, or even *p*-nitro-aniline, was employed; and after the first coupling, the second amino group was then freed and diazotized. Here both compounds are generally indexed.



STATISTICS.—Imported '14:— 11,088 lbs.  
 Manufactured '17:—272,056 lbs.  
 Manufactured '18:—215,148 lbs.  
 Manufactured '19:—234,332 lbs.  
 Manufactured '20:— ?

FORMATION.—(1) From amino-azo-benzene by reduction. (2) From *p*-nitro-aniline by reduction

LITERATURE.—Cain, Intermediate Products (2d Ed.), 87  
 Lange, Zwischenprodukte, #552–555

Dyes Derived from *p*-Phenylene-diamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
13	STILBENE DYE Polychromine B Diphenyl Orange RR	I '14:— 16,113 M '18:— ?	<i>p</i> -Phenylene-diamine (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols)	D
61	MONOAZO DYES Victoria Violet	I '14:— 52,365 M '17:— ? M '18:— ? M '19:— 105,086 I '20:— 2,182 M '20:— ?	Chromotropic Acid [The <i>p</i> -Phenylene-dia- mine from <i>p</i> -Nitro- aniline or <i>p</i> -Amino- acetanilide]	A
205	Diphenyl Chrysoine RR		<i>p</i> -Phenylene-diamine (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) Phenol [Ethylation]	D
206	Diphenyl Catechine G	I '14:— 8,642	<i>p</i> -Phenylene-diamine (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) Dimethyl-gamma Acid	D
207	Diphenyl Fast Brown G	I '14:— 992	<i>p</i> -Phenylene-diamine (2 mols) <i>p</i> -Nitro-toluene- <i>o</i> -sul- fonic Acid (2 mols) Phenyl-gamma Acid	D
208	DISAZO DYES Leather Brown	I '14:— 500 M '19:— ? M '20:— ?	<i>p</i> -Phenylene-diamine (2 mols) <i>m</i> -Phenylene-diamine	B
290	Violet Black		Nevile-Winther's Acid $\alpha$ -Naphthylamine	D
291	Azo Alizarin Bordeaux W		Salicylic Acid Nevile-Winther's Acid	M

Dyes Derived from *p*-Phenylene-diamine (continued)

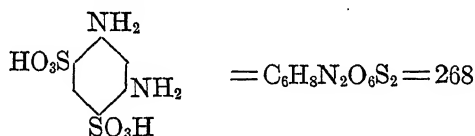
<i>Schultz Number or Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
292	Azo Alizarin Black I		Salicylic Acid Chromotropic Acid	M
	TRISAZO DYES			
436	Columbia Black FF	I '14:—402,997 M '18:— ? M '19:— ? I '20:— 23,350 M '20:— ?	1-Naphthylamine-6- and-7-sulfonic Acids Gamma Acid <i>m</i> -Phenylene-diamine	D
437	Isodiphenyl Black R		Gamma Acid Resorcinol <i>m</i> -Phenylene-diamine	D
	OXAZINE DYE			
621	Cresyl Blue 2BS		5-Dimethylamino-2- nitroso- <i>p</i> -cresol	B
	AZINE DYES			
695	Paraphenylene Violet	I '20:— 337	$\alpha$ -Amino-azo-naph- thalene	B
701	Paraphenylene Blue R		Amino-azo-benzene	B
702	Para Blue		Aniline (3-4 mols) <i>o</i> -Toluidine <i>p</i> -Toluidine or [Spirit Blue]	B
	SULFUR DYES			
713	Thiophor Bronze 5G	M '19:— ?	[ <i>p</i> -Amino-acet-black] [Sulfur]	S
714	Thiophor Yellow Bronze C		<i>p</i> -Amino-acetanilide Benzidine [Sulfur]	S
718	St. Denis Black B		Phenol Nitro-benzene [S <sub>2</sub> Cl <sub>2</sub> , S, Na <sub>2</sub> S]	S

Dyes Derived from *p*-Phenylene-diamine (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
727	Auronal Black B		1-Chloro-2:4-dinitro-benzene [Glycerol; S+Na <sub>2</sub> S]	S
923	ANILINE BLACK GROUP Ursol D, DB		[Oxidation on hair]	Fur

*m*-Phenylene-diamine-disulfonic Acid

4:6-Diamino-*m*-benzene-disulfonic Acid (*C. A. nomen.* SO<sub>3</sub>H = 1)



FORMATION.—From *m*-phenylene-diamine hydrochloride by treating it with five parts of 40 per cent oleum, heating at 100° for several hours, then at 120° for 6–10 hours

LITERATURE.—Lange, *Zwischenprodukte*, #1146, 1147

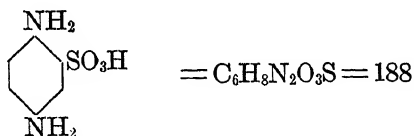
Green, *Organic Coloring Matters* (1908), 36

Dyes Derived from *m*-Phenylene-diamine-disulfonic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
192	MONOAZO DYES Cotton Orange G	I '14:— 1,877	Primuline	D
210	DISAZO DYES Cotton Orange R	I '14:— 16,459 I '20:— 51	Primuline-sulfonic Acid Metanilic Acid	D
306	Pyramine Orange 3G	I '14:— 7,863 I '20:— 396	Benzidine Nitro- <i>m</i> -phenylene-diamine	D

***p*-Phenylene-diamine-sulfonic Acid**2: 5-Diamino-benzene-sulfonic Acid (*C. A. nomen.*)

*Note.*—As a rule this compound is not used as such, being formed as the azo derivative in the dye molecule from the reduction of the azo derivative of *p*-nitro-aniline-*o*-sulfonic acid



FORMATION.—From *p*-nitro-aniline-*o*-sulfonic acid by reduction

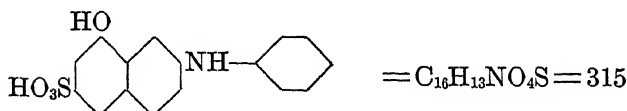
LITERATURE.—Lange, Zwischenprodukte, #920-924

**Dye Derived from *p*-Phenylene-diamine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
458	TRISAZO DYE Carbon Black		1-Naphthylamine-6(7)-sulfonic Acid <i>m</i> -Phenylene-(Tolylene-)diamine or 1: 3-Naphthylene-diamine-6-sulfonic Acid (2 mols)	D

**Phenyl-gamma Acid**

2-Phenylamino-8-naphthol-6-sulfonic Acid

7-Anilino-1-naphthol-3-sulfonic Acid (*C. A. nomen.*)



FORMATION.—From gamma acid (2-amino-8-naphthol-6-sulfonic acid) by heating with aniline and aniline hydrochloride at 160°

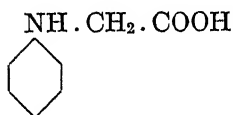
LITERATURE.—Lange, Zwischenprodukte, #2846–2847

**Dyes Derived from Phenyl-gamma Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
207	MONOAZO DYE Diphenyl Fast Brown G	I '14:— 992	<i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid <i>p</i> -Phenylene-diamine	D
349	DISAZO DYES Diamine Brown B	I '20:— 24	Benzidine Salicylic Acid	D
445	TRISAZO DYE Crumpsall Direct Fast Brown O		Benzidine Salicylic Acid Aniline	D

**Phenyl-glycine**

*N*-Phenyl-glycine (*C. A. nomen.*)



STATISTICS.—Manufactured '17:— ?  
 Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—By action of chloro-acetic acid on aniline

LITERATURE.—Cain, Intermediate Products (2d Ed.), 153  
 Lange, Zwischenprodukte, #96–109, 111

## Dyes Derived from Phenyl-glycine

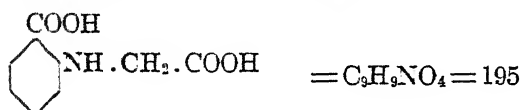
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
874	INDIGO GROUP DYES Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine (2 mols) [Sodamide]	V
876	Indigo MLB Indigo White		Phenyl-glycine (2 mols) [Sodamide, Reduction] or [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine (2 mols), etc. or [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine (2 mols), etc. or [Indigo, Sulfonation]	A
879	Brom Indigo Rathjen Indigo MLB, RR	I '14:— 53,640 M '20:— ?	Phenyl-glycine (2 mols), etc. or [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine (2 mols), etc. or [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES (continued)			
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine (2 mols), etc. or [Indigo, Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phenyl-glycine (2 mols), etc. or [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine (2 mols), etc. or [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine (2 mols), etc. or [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,117 I '20:— 3,503	Phenyl-glycine (2 mols), etc. or [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine (2 mols), etc. or [Indigo, Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phenyl-glycine (2 mols), etc. Benzoyl chloride or [Indigo, Benzoyl chloride]	V

Dyes Derived from Phenyl-glycine (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
890	INDIGO GROUP DYE ( <i>continued</i> ) Ciba Yellow G	I '14:— 48	Phenyl-glycine (2 mols), etc. Benzoyl chloride or [Indigo, Benzoyl chloride, Bromination]	V

Phenyl-glycine-*o*-carboxylic AcidN-(Carboxy-methyl)-anthranilic Acid (*C. A. nomen.*)

FORMATION.—Phthalic anhydride is converted through phthalimide into anthranilic acid. This latter by reaction with chloro-acetic acid forms the phenyl-glycine-*o*-carboxy acid

LITERATURE.—Lange, Zwischenprodukte, #379, 383-393

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
874	INDIGO GROUP DYES Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Phenyl-glycine- <i>o</i> -carboxylic Acid (2 mols) [Sodamide]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
876	Indigo MLB Indigo White		Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols) [Sodamide, Reduction] <i>or</i> [Indigo, Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc. <i>or</i> [Indigo, Sulfonation]	A
878	Indigotine P		Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc. <i>or</i> [Indigo, Sulfonation]	A
879	Bromo Indigo Rathjen Indigo MLB/RR	I '14:— 53,610 M '20:— ?	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols) etc. <i>or</i> [Indigo, Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc. <i>or</i> [Indigo, Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc. <i>or</i> [Indigo, Bromination]	V

Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid (*continued*)

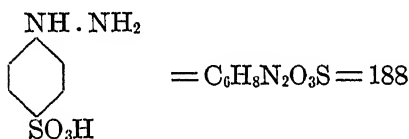
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
882	Indigo MLB/5B Ciba Blue G	I '14:— 4,356 I '20:— 1,002	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc.  or [Indigo, Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc.  or [Indigo, Bromination]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc.  or [Indigo, Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc.  or [Indigo, Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc.  or [Indigo, Bromination, Chlorination]	V
889	Indigo Yellow 3G		Phenyl-glycine- <i>o</i> -car- boxylic Acid (2 mols), etc. Benzoyl chloride  or [Indigo, Benzoyl chloride]	V

**Dyes Derived from Phenyl-glycine-*o*-carboxylic Acid** (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
890	INDIGO GROUP DYES ( <i>continued</i> ) Ciba Yellow G	I' 14:— 48	Phenyl-glycine- <i>o</i> -carboxylic Acid (2 mols), etc. Benzoyl chloride [Bromination] or [Indigo Yellow 3G, Bromination]	V

**Phenyl-hydrazine-*p*-sulfonic Acid**

*p*-Hydrazino-benzene-sulfonic Acid (*C. A. nomen.*)



STATISTICS.—Manufactured '20:—441,117 lbs.

FORMATION.—(1) Sulfanilic acid is diazotized and then reduced with sodium bisulfite. (2) Aniline is diazotized and reduced with sodium bisulfite, forming phenyl-hydrazine, which is then sulfonated with 66° sulfuric acid at 100°

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 49  
Lange, *Zwischenprodukte*, #629

**Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid**

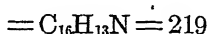
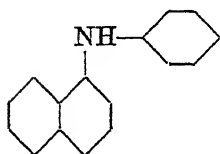
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
19	PYRAZOLONE DYES Flavazine L Fast Light Yellow	I '14:— 38,908 I '20:— 9,327	Aniline [Ethyl Aceto-acetate]	A
20	Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline [Ethyl Oxal-acetate]	A

Dyes Derived from Phenyl-hydrazine-*p*-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
23	PYRAZOLONE DYES ( <i>continued</i> ) Tartrazine	I '14:—272,477 M '17:— ? M '18:— ? M '19:— ? I '20:— 47,877 M '20:—701,722	Phenyl-hydrazine- <i>p</i> -sulfonic Acid (2 mols) Dihydroxy-tartaric Acid <i>or</i> Sulfanilic Acid [Ethyl Oxal-acetate]	A
	27 Dianil Yellow 2R		Primuline-sulfonic Acid [Ethyl Aceto-acetate]	D

## 1-Phenyl-3-methyl-5-pyrazolone

See, 3-Methyl-1-phenyl-5-pyrazolone

Phenyl- $\alpha$ -naphthylamine*N*-Phenyl-1-naphthylamine (*C. A. nomen.*)

STATISTICS.—Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '19:— ?  
 Manufactured '20:— ?

FORMATION.—From  $\alpha$ -naphthylamine hydrochloride and aniline by heating together

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 187  
 Cf. Lange, *Zwischenprodukte*, #2827  
 Thorpe, *Dic. Chemistry*, 3, 587

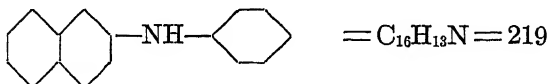


Dyes Derived from Phenyl- $\alpha$ -naphthylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
263	DISAZO DYES Jet Black R		Aniline-2: 4-disulfonic Acid $\alpha$ -Naphthylamine	A
361	Sulfonazurine	I '14:— 300	Benzidine-sulfon-disul- fonic Acid Phenyl- $\alpha$ -naphthyl- amine (2 mols)	D
559	DIPHENYL-NAPHTHYL- METHANE DYE Victoria Blue B	I '14:—127,769 M '17:— ? M '18:— ? M '19:— ? I '20:— 11,782 M '20:— ?	Ketone or Hydrol	B
693	AZINE DYE Milling Blue	I '14:— 3,082	Aniline (2 mols) Phenyl- $\alpha$ -naphthyl- amine (2 mols) Phenol [Sulfonation]	M

Phenyl- $\beta$ -naphthylamine

*N*-Phenyl-2-naphthylamine (*C. A. nomen.*)



FORMATION.—From  $\beta$ -naphthol and aniline (or hydrochloride) by heating together in an open vessel to around 200°

LITERATURE.—Lange, *Zwischenprodukte*, #2827  
Thorpe, *Dic. Chemistry*, 3, 599

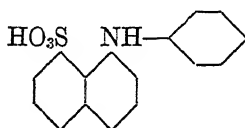
Dye Derived from Phenyl- $\beta$ -naphthylamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
676	AZINE DYE Neutral Blue	I '14:— 615	Nitroso-dimethyl-aniline	B

## Phenyl-1-naphthylamine-8-sulfonic Acid

8-Anilino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

Phenyl-peri Acid



STATISTICS.—Imported '14:—9,139 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—1-Naphthylamine-8-sulfonic acid, aniline, and aniline hydrochloride are heated together in an autoclave

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 194

## Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
85	MONOAZO DYE Omega Chrome Black PV		2-Amino-6-nitro- <i>p</i> -cresol	ACr
188	Tolyl Blue SR Sulfon Acid Blue R	I '14:— 45,038 M '17:— ? M '18:— ? M '19:— ? M '20:— 454,185	H Acid	A

Dyes Derived from Phenyl-1-naphthylamine-8-sulfonic Acid (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
256	DISAZO DYES Sulfon Black 3B		Metanilic Acid $\alpha$ -Naphthylamine	A
257	Sulfocyanine	I '14:—145,649 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid $\alpha$ -Naphthylamine	A
265	Sulfocyanine Black B	I '14:— 69,590 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Laurent's Acid $\alpha$ -Naphthylamine or 1-Naphthylamine-6- and 7-sulfonic Acids	A

*N*-Phenyl-*o*-phenylene-diamine (*C. A. nomen.*)

See, *o*-Amino-diphenylamine

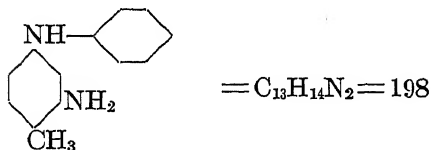
*N*-Phenyl-*p*-phenylene-diamine (*C. A. nomen.*)

See, *p*-Amino-diphenylamine

*N*<sup>1</sup>-Phenyl-4-*m*-tolylene-diamine (*C. A. nomen. N H<sub>2</sub> = 1*)

Phenyl-*p*-amino-*o*-toluidine (*CH<sub>3</sub> = 1*)

3-Amino-4-methyl-diphenylamine



FORMATION.—From *m*-tolylene-diamine hydrochloride by melting with aniline at 220–270°

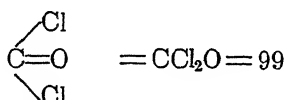
LITERATURE.—Lange, Zwischenprodukte, #1621, 1622

Dyes Derived from *N*<sup>1</sup>-Phenyl-4-*m*-tolylene-diamine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
684	AZINE DYES Rhoduline Violet	I '14:— 2,751 I '20:— 35	Nitroso-dimethyl-aniline	B
684	Rhoduline Red B		Nitroso-ethyl-aniline	B
684	Rhoduline Red G		Nitroso-ethyl- <i>o</i> -toluidine	B

Phosgene (*C. A. nomen.*)

## Carbonyl Chloride



STATISTICS.—Imported '14:—very small

Manufactured in recent years in undisclosed quantities

FORMATION.—From chlorine and carbon monoxide, in presence of a catalyst, for example, a suitable charcoal

LITERATURE.—Ullmann, *Enzy. tech. Chemie*, 3, 498

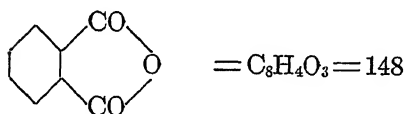
## Dyes Derived from Phosgene

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
279	DISAZO DYES Benzo Fast Scarlet	I '14:— 36,674 M '19:— ? I '20:— 24,153	J Acid (2 mols) Aniline Amino-azo-benzene	D
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	Acetyl- <i>p</i> -phenylene-diamine (2 mols) Salicylic Acid (2 mols)	D

Dyes Derived from Phosgene (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
516	TRIPHENYL-METHANE DYES Crystal Violet	I '14:— 51,872	Dimethyl-aniline (3 mols)	B
		M '17:— ?		
		M '18:— ?		
		M '19:— ?		
		I '20:— 2,919		
		M '20:— ?		
518	Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline (3 mols)	B
810	ANTHRAQUINONE AND ALLIED DYES Helidone Yellow 3GN	I '14:— 20,744	2-Amino-anthraqui- none (2 mols)	V
		I '20:— 2,515		

Phthalic Anhydride



STATISTICS.—Imported '14:— 63,574 lbs.  
 Manufactured '17:—138,857 lbs.  
 Manufactured '18:—227,414 lbs.  
 Manufactured '19:—290,677 lbs.  
 Manufactured '20:—796,210 lbs.

FORMATION.—(1) Naphthalene is oxidized with air in presence of a catalyst. (2) Naphthalene is oxidized by means of sulfur trioxide in presence of mercury.

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 162

## Dyes Derived from Phthalic Anhydride

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	XANTHONE DYES			
571	Rhodamine 6G	I '14:— 37,515 I '20:— 8,574	Ethyl- <i>m</i> -amino-phenol (2 mols) [Ethylation]	B
572	Rhodamine G	I '14:— 2,648 I '20:— 217	Diethyl- <i>m</i> -amino- phenol (2 mols) Aniline [removes one C <sub>2</sub> H <sub>5</sub> group] <i>or</i> [Heating of Rhodamine B with aniline salt]	B
573	Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Diethyl- <i>m</i> -amino- phenol (2 mols) <i>or</i> Resorcinol (2 mols) [PCl <sub>5</sub> ; diethyl-amine]	B
574	Rhodamine 3B		Diethyl- <i>m</i> -amino- phenol (2 mols) [Ethyl esterification] <i>or</i> [Ethyl ester of Rhoda- mine B]	B
580	Fast Acid Violet B	I '14:— 20,688 I '20:— 2,907 M '19:— ?	Resorcinol (2 mols) Aniline <i>or</i> <i>p</i> -Toluidine (2 mols) [PCl <sub>5</sub> ; sulfonation] <i>or</i> [Dichloro-fluoresceine <i>and</i> Aniline <i>or</i> <i>p</i> -Toluidine; sul- fonation]	A

Dyes Derived from Phthalic Anhydride (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	XANTHONE DYES ( <i>continued</i> )			
581	Fast Acid Eosine G Fast Acid Phloxine A	I '14:— 650 I '20:— 5,234	Diethyl- <i>m</i> -amino- phenol (2 mols) [Sulfonation] or [Rhodamine B, sulfo- nated]	A
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Resorcinol (2 mols) <i>o</i> -Toluidine (2 mols) [PCl <sub>5</sub> , Sulfonation] or [Dichloro-fluoresceine and <i>o</i> -toluidine, Sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Resorcinol (2 mols) Mesidine (2 mols) [PCl <sub>5</sub> , Sulfonation] or [Dichloro-fluoresceine and mesidine, sulfo- nation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:— 161,153 M '19:— 121,303 I '20:— 296 M '20:— 85,489	Resorcinol (2 mols) [Bromine] or [Tetrabromo-fluore- sceine]	A

Dyes Derived from Phthalic Anhydride (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	XANTHONE DYES ( <i>continued</i> )			
588	Eosine Spirit Solubl. Methyl Eosine		Resorcinol (2 mols) [Bromine; Methyl esterification] <i>or</i> Eosine methyl ester]	ss
589	Eosine S	I '14:— 2,315 M '20:— ? M '20:— ?	Resorcinol (2 mols) [Bromine; Ethyl esterification] <i>or</i> [Eosine ethyl ester]	ss
590	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Resorcinol (2 mols) [Bromination, Nitra- tion] <i>or</i> [Dibromo-fluoresceine nitrated]	A
591	Erythrosine G	I '14:— 99	Resorcinol (2 mols) [Iodation] <i>or</i> [Diiodo-fluoresceine]	A
592	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Resorcinol (2 mols) [Iodation] <i>or</i> [Tetraiodo-fluoresceine]	A
599	Galleine	I '14:— 15,404 M '19:— ? I '20:— 7,469 M '20:— ?	Gallic Acid (2 mols) <i>or</i> Pyrogallol (2 mols)	M



Dyes Derived from Phthalic Anhydride (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	XANTHONE DYES (continued)			
600	Coeruleine B	M '19:— ? M '20:— ?	Resorcinol (2 mols) [Dehydration] or [Fluoresceine dehydrated]	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Gallic Acid (2 mols) or Pyrogallol (2 mols) [Dehydration] or [Galleine dehydrated]	M
	QUINOLINE DYES			
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Quinaldine	SS
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Quinaldine [Sulfonation]	A
	ANTHRAQUINONE AND ALLIED DYES			
758	Sirius Yellow G		Naphthalene	CL
782	Anthracene Brown Alizarin Brown	I '14:—115,586 M '17:— ? M '18:— ? M '19:— 40,426 I '20:— 2,728 M '20:— 42,840	Gallic Acid	M
	INDIGO GROUP DYES			
874	Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 M '20:— 18,178,231 I '20:—520,347	Phthalic Anhydride (2 mols)	V

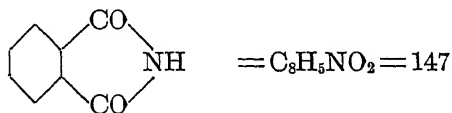
Dyes Derived from Phthalic Anhydride (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
876	Indigo MLB Indigo White		Phthalic Anhydride (2 mols) [Reduction]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 M '20:— 1,395,000 I '20:— 5,512	Phthalic Anhydride (2 mols) [Sulfonation]	A
878	Indigotine P		Phthalic Anhydride (2 mols) [Sulfonation]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Phthalic Anhydride (2 mols) [Bromination]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Phthalic Anhydride (2 mols) [Bromination]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Phthalic Anhydride (2 mols) [Bromination]	V

Dyes Derived from Phthalic Anhydride (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Phthalic Anhydride (2 mols) [Chlorination]	V
886	Brilliant Indigo BASF/G	I '14:— 12,057	Phthalic Anhydride (2 mols) [Chlorination, Bromination]	V
889	Indigo Yellow 3G		Phthalic Anhydride (2 mols) Benzoyl Chloride	V
890	Ciba Yellow G	I '14:— 48	Phthalic Anhydride (2 mols) Benzoyl Chloride [Bromination]	V

**Phthalimide**



STATISTICS.—Manufactured in 1920 in undisclosed amount

FORMATION.—By treatment of molten phthalic anhydride with gaseous ammonia

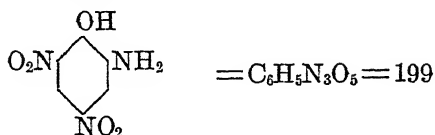
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 147

USES.—For preparation of anthranilic acid

**Piria's Acid**

*See*, Naphthionic Acid

## Picramic Acid



STATISTICS.—Manufactured '17:— ?

Manufactured '18:—235,652 lbs.

Manufactured '19:—150,458 lbs.

Manufactured '20:—138,350 lbs.

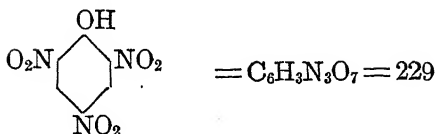
FORMATION.—From picric acid by reduction, using sodium hydrogen sulfide or sodium sulfide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 117

## Dyes Derived from Picramic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application-Class</i>
88	MONOAZO DYES Acid Anthracene Brown R	I '14:— 33,053 M '17:— ? M '19:— ? I '20:— 1,400 M '20:— ?	<i>m</i> -Phenylene-diamine- [sulfonic Acids]	ACr
89	Metachrome Brown B	I '14:— 1,001 M '17:— ? M '18:—349,961 M '19:— ? M '20:—192,914	<i>m</i> -Phenylene-diamine or <i>m</i> -Tolylene-diamine or Chloro- <i>m</i> -phenylene-diamine	M
90	Chrome Brown P		<i>m</i> -Amino-phenol	M
91	Anthracyl Chrome Green D	I '14:— 4,596 M '18:— ? I '20:— 3,316	Napththionic Acid	ACr
92	Metachrome Bordeaux R		3-Amino-4-methyl-phenyl- <i>p</i> -tolyl-sulfamide	M
219	DISAZO DYE Chrome Patent Green N		Aniline K Acid	ACr

**Picric Acid**



STATISTICS.—Manufactured in 1919 and 1920 in an indeterminate amount for dyeing purposes. Prior to 1919 it was made in very large quantities for explosive uses

FORMATION.—Phenol is sulfonated and then trinitrated

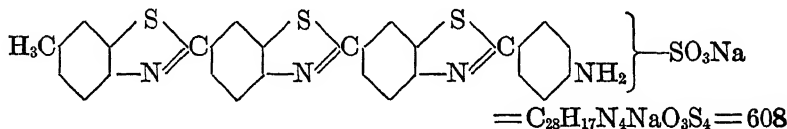
LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 114  
 Lange, *Zwischenprodukte*, #1116–1121  
 Schultz, *Farbstofftabellen* (1914), #5

USES.—For the manufacture of picramic acid. It is also a dye, Schultz #5

**Primuline-sulfonic Acid (Sodium Salt)**

(This is the "Primuline" of commerce)

(Primuline "base" is the unsulfonated product)



STATISTICS.—See #616 in following table

FORMATION.—*p*-Toluidine and sulfur are heated together, resulting in a mixture of primuline base and *p*-dehydro-thio-*p*-toluidine, known as primuline "melt." This can be separated by vacuum distillation. However it is generally sulfonated, using 23 per cent oleum, and then separated by the greater solubility of the ammonium salt of the primuline-sulfonic acid

LITERATURE.—Schultz, *Farbstofftabellen*, #616  
 Wahl, *Organic Dyestuffs*, 299  
 Thorpe, *Dic. Chemistry*, 4, 386

## Dyes Derived from Primuline-sulfonic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
18	STILBENE DYE Diphenyl Fast Yellow	I '14:— 10,229 I '20:— 1,102	Primuline-sulfonic Acid (2 mols) Dinitro-dibenzyl-disul- fonic Acid or Dinitro-stilbene-di- sulfonic Acid	D
25	PYRAZOLONE DYES Dianil Yellow 3G		[Ethyl aceto-acetate]	D
26	Dianil Yellow R		3-Methyl-1-phenyl-5- pyrazolone	D
27	Dianil Yellow 2R		3-Methyl-1- <i>p</i> -sulfo- phenyl-5-pyrazolone or Phenyl-hydrazine- <i>p</i> - sulfonic Acid [Ethyl aceto-acetate]	D
190	MONOAZO DYES Alkali Brown Benzo Brown 5R	M '19:— ? M '20:— 2,987	<i>m</i> -Phenylene-diamine	D
191	Pyramine Yellow R	I '14:— 5,727 I '20:— 100	Nitro- <i>m</i> -phenylene- diamine	D
192	Cotton Orange G	I '14:— 1,877	<i>m</i> -Phenylene-diamine- disulfonic Acid	D
195	Rosophenine SG	M '18:— ? M '19:— ? M '20:— 19,639	Nevile-Winther's Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Schaeffer's Acid	D

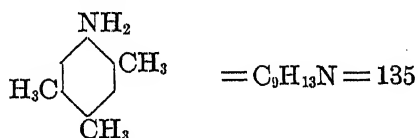
Dyes Derived from Primuline-sulfonic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
198	Clayton Yellow Thiazol Yellow	I '14:— 29,879 M '18:— ? M '19:— ? M '20:— ? I '20:— 11,182	Dehydrothio- <i>p</i> -tolui- dine-sulfonic Acid (2 mols) or Primuline (2 mols)	D
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 M '20:— ? I '20:— 125	Salicylic Acid	D
	DISAZO DYES			
209	Terra Cotta FC	I '14:— 551	<i>m</i> -Phenylene-diamine Naphthionic Acid	D
210	Cotton Orange R	I '14:— 16,459 I '20:— 51	<i>m</i> -Phenylene-diamine- disulfonic Acid Metanilic Acid	D
	THIOBENZENYL DYES			
615	Thioflavine S	I '14:— 4,948 M '19:— ? M '20:— ? I '20:— 675	[Methylation]	D
616	Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,788 M '19:— 271,338 M '20:— 183,179 I '20:— 441		D

Pseudocumidine (*C. A. nomen.*)*ψ*-Cumidine

2: 4: 5-Trimethyl-aniline

1: 2: 4-Trimethyl-5-amino-benzene



STATISTICS.—Imported '14:— 6,617 lbs.

Manufactured '17:— ?

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:—28,405 lbs.

FORMATION.—Xylidine hydrochloride is digested with methanol ( $\text{CH}_3\text{OH}$ ) in an autoclave at  $280\text{--}300^\circ$  and the product converted to nitrates and crystallized. The sparingly soluble nitrates are separated and washed, and treated with alkali to convert to bases, which are a mixture of xylidines and cumidines. The bases are then fractionally distilled, and that fraction coming over at  $225\text{--}245^\circ$  is allowed to crystallize and is pressed to remove oily products. It consists largely of pseudocumidine

LITERATURE.—Thorpe, Dic. Chemistry, 2, 177 (1912 Ed.); or 2, 434 (1921 Ed.)

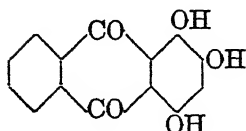
Lange, Zwischenprodukte, #1061

#### Dye Derived from Pseudocumidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
83	MONOAZO DYE Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	R Acid	A

#### Purpurin (*C. A. nomen.*)

1:2:4-Trihydroxy-anthraquinone





FORMATION.—From alizarin by oxidation with manganese dioxide and sulfuric acid

LITERATURE.—Lange, *Zwischenprodukte*, #3129, 3271

Barnett, Anthracene and Anthraquinone

**Dyes Derived from Purpurin**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
783	ANTHRAQUINONE AND ALLIED DYES Purpurin			M
862	Alizarin Blue Black B	I '14:— 54,706 I '20:— 28,802	Aniline [Sulfonation]	M

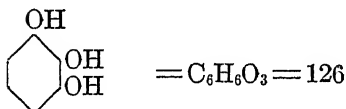
**Pyrogallic Acid**

*See*, Pyrogallol

**Pyrogallol** (*C. A. nomen.*)

1: 2: 3-Trihydroxy-benzene

Pyrogallic Acid



STATISTICS.—Imported '14:—24,964 lbs.

Manufactured regularly, but amounts not disclosed

FORMATION.—From gallic acid by heating in an autoclave in presence of water

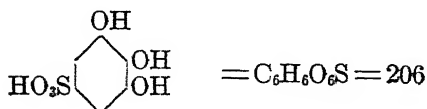
LITERATURE.—Lange, *Zwischenprodukte*, #958

Green, *Organic Coloring Matters* (1908), 45

## Dyes Derived from Pyrogallol

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
62	MONOAZO DYE Azo Galleine		Dimethyl- <i>p</i> -phenylene- diamine	M
84	Azo Chromine		<i>p</i> -Amino-phenol	M
158	Chrome Brown RR	I '14:— 7,241 M '17:— ? I '20:— 2,183	4-Amino-1-phenol-2: 6- disulfonic Acid	M
599	XANTHONE DYES Galleine	I '14:— 15,404 M '19:— ? I '20:— 5,075 M '20:— ?	Phthalic Anhydride Pyrogallol (2 mols)	M
601	Coeruleine S	I '14:— 3,404 M '19:— ? I '20:— 9,392	Phthalic Anhydride Pyrogallol (2 mols) [Dehydration] or [Galleine dehydrated]	M
769	ANTHRAQUINONE AND ALLIED DYES Alizarin Yellow C		[Acetic Acid]	M
770	Alizarin Yellow A		Benzoic Acid or Benzo trichloride	M
773	Anthracene Yellow	I '14:— 4,046	[Aceto-acetic Ethyl Ester; Bromination]	M

## Pyrogallol-5-sulfonic Acid

3: 4: 5-Trihydroxy-benzene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—1: 3-Dichloro-2-hydroxy-benzene-5-sulfonic acid (as potassium salt) is fused with concentrated caustic potash solution at 150–160°

LITERATURE.—Lange, Zwischenprodukte, #959  
Ger. Pat., 203,145; Frdl. 9, 247

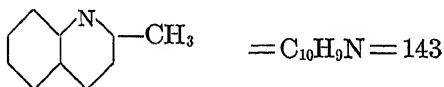
**Dyes Derived from Pyrogallol-5-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
623	OXAZINE DYE Pyrogallol-cyanine-sulfonic Acid		Nitroso-dimethyl-aniline	M

**Quinaldine** (*C. A. nomen.*)

2-Methyl-quinoline

$\alpha$ -Methyl-quinoline



STATISTICS.—Manufactured '19:— ?  
Manufactured '20:— ?

FORMATION.—By condensing aniline and paracetaldehyde either cold, or hot,—in the latter case using hydrochloric acid and aluminum or zinc chloride to catalyze the reaction

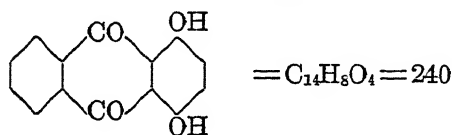
LITERATURE.—Cain, Intermediate Products (2d Ed.), 84  
Lange, Zwischenprodukte, #2000–2002

## Dyes Derived from Quinaldine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
610	QUINOLINE DYES Quinoline Red		Benzo-trichloride Isoquinoline	B
612	Quinoline Yellow Spirit Soluble	I '14:— 79,553 I '20:— 205	Phthalic Anhydride	ss
613	Quinoline Yellow Water Soluble	I '14:— 15,354 I '20:— 34,440	Phthalic Anhydride [Sulfonation]	A

Quinizarin (*C. A. nomen.*)

1: 4-Dihydroxy-anthraquinone



FORMATION.—From anthraquinone by oxidation with sulfuric acid in presence of boric acid

LITERATURE.—Lange, Zwischenprodukte, #3233, 3260, 3268, 3270, 3274, 3276, 3314, 3351

Cain, Intermediate Products (2d Ed.), 255

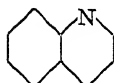
## Dyes Derived from Quinizarin

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
852	ANTHRAQUINONE AND ALLIED DYES Alizarin Irisol D		<i>p</i> -Toluidine [Sulfonation]	A
852	Alizarin Direct Violet R		4-Toluidine-3-sulfonic Acid	A

Dyes Derived from Quinizarin (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> )			
865	Alizarin Cyanine Green E		<i>p</i> -Toluidine (2 mols) [Sulfonation]	ACr
865	Alizarin Direct Green G	I '14:— 2,000 I '20:— 31,851 M '20:— . ?	4-Toluidine-3-sulfonic Acid (2 mols)	ACr

Quinoline \*



STATISTICS.—Imported '14:—very small  
Manufactured '19:— ?

FORMATION.—(1) By extraction from coal-tar. (2) By synthesis through the heating together of aniline, nitro-benzene, glycerol and sulfuric acid for some time, first at 125° and then at 180°

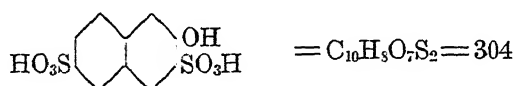
LITERATURE.—Lange, Zwischenprodukte, #1995  
Thorpe, Dic. Chemistry, 4, 468

Dye Derived from Quinoline

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
611	QUINOLINE DYE Quinoline Blue		Lepidine [Amyl iodide]	Photography

**R Acid**2-Naphthol-3:6-disulfonic Acid (*C. A. nomen.*) $\beta$ -Naphthol-disulfonic Acid R $\beta$ -Naphthol- $\alpha$ -disulfonic Acid

*Note.*—*R Acid* is occasionally applied to other naphthalene derivatives, e.g., 2-amino-3-naphthol-6-sulfonic acid, 2-naphthylamine-3:6-disulfonic acid, 2:3-dihydroxy-naphthalene-6-sulfonic Acid



STATISTICS.—Imported '14:— 46,267 lbs.  
 Manufactured '18:— 712,033 lbs.  
 Manufactured '19:—1,008,007 lbs.  
 Manufactured '20:—1,250,674 lbs.

FORMATION.—From  $\beta$ -naphthol by disulfonation, and separation from the G acid simultaneously formed

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 226  
 Lange, *Zwischenprodukte*, #2651, 2652  
 Thorpe, *Dic. Chemistry*, **3**, 626

**Dyes Derived from R Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
<b>MONOAZO DYES</b>				
39	Ponceau G	M '17:— ? M '19:— ?	Aniline	A
47	Orange III	M '18:— ?	$\beta$ -Naphthol	A
65	Azo Coralline L	M '17:— ? M '18:— ? M '19:— ? I '20:— 249 M '20:— ?	<i>p</i> -Amino-acetanilide	A

Dyes Derived from R Acid (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
82	Ponceau R, 2R Scarlet R, 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	Xylidine	A
83	Ponceau 4R	I '14:— 3,557 M '17:— ? M '18:— ? M '19:— 24,152 M '20:— ?	Pseudocumidine	A
101	Coccinine B		m-Amino-p-cresol Methyl Ether	A
112	Fast Red B Bordeaux B	I '14:— 25,821 M '17:—120,595 M '18:—200,415 M '19:—161,862 I '20:— 7,882 M '20:—217,406	α-Naphthylamine	A
168	Amaranth	I '14:— 86,067 M '17:— 66,069 M '18:— 73,539 M '19:—294,416 I '20:— 110 M '20:—204,958	Naphthionic Acid	A
202	Acid Alizarin Red B Palatine Chrome Red B	I '14:— 7,374 M '18:— ? M '19:— 28,081 I '20:— 1,342 M '20:— 67,817	Anthranilic Acid	ACr CL
	DISAZO DYES			
236	Cloth Red B Wool Red B	I '14:— 14,293 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	o-Amino-azo-toluene	A

## Dyes Derived from R Acid (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES (continued)			
238	Union Fast Claret		Amino-azo-xylene	A
244	Coomassie Wool Black S	M '18:— ? M '19:— ?	Acetyl- <i>p</i> -phenylene- diamine $\alpha$ -Naphthylamine	A
269	Naphthol Black 6B	I '14:—120,512 I '20:— 1,500 M '20:— ?	1-Naphthylamine-4: 6- and -4: 7-disulfonic Acids $\alpha$ -Naphthylamine	A
270	Brilliant Croceine 9B		Amino-G Acid Aniline G Acid or R Acid	A
272	Naphthol Black B Brilliant Black B	I '14:—103,598 M '19:— ? I '20:— 50	Amino-G Acid $\alpha$ -Naphthylamine	A
298	Milling Red R		Diamino-diphenyl- methane R Acid (2 mols)	A
299	Cinnabar Scarlet BF		Diamino-dixylyl- methane R Acid (2 mols)	CL
300	Cinnabar Scarlet G Cotton Ponceau		Diamino-dixylyl- phenyl-methane R Acid (2 mols)	CL
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine Salicylic Acid	D
412	Congo Blue 2B		Dianisidine Neville-Winther's Acid	D



## Dyes Derived from R Acid (continued)

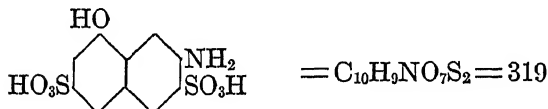
Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
	DISAZO DYES (continued)			
414	Indazurine B		Dianisidine 1:7-Dihydroxy-naphthalene-4-sulfonic Acid	D
429	Indazurine BB		Dianisidine 1:7-Dihydroxy-2-naphthoic-4 sulfonic Acid	D
433	Coomassie Black B		1:4-Naphthylene-diamine-2-sulfonic Acid $\beta$ -Naphthylamine	A
434	Coomassie Navy Blue	I '20:— 42,357	1:4-Naphthylene-diamine-2-sulfonic Acid $\beta$ -Naphthol	A
484	TRISAZO DYE Milling Scarlet B		Diamino-azoxy-toluene Nevile-Winther's Acid	A

## 2R Acid

2-Amino-8-naphthol-3:6-disulfonic Acid

Amino-naphthol-disulfonic Acid RR or 2R

7-Amino-1-naphthol-3:6-disulfonic Acid (C. A. nomen.)



FORMATION.—From sodium 2-naphthylamine-3:6:8-trisulfonate by fusion with caustic soda at 220–260°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 239  
Lange, Zwischenprodukte, #2734

## Dyes Derived from 2R Acid

Schultz number or Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
444	MONOAZO DYE Azo Archil R		Aniline	A
442	TRISAZO DYES Direct Black V	I '14:—145,738	Benzidine $\alpha$ -Naphthylamine Gamma Acid	D
443	Direct Indone Blue R		Benzidine $\alpha$ -Naphthylamine H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine Salicylic Acid <i>m</i> -Phenylene-diamine	D
453	Columbia Black R	I '14:— 1,307	Tolidine <i>m</i> -Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine Salicylic Acid <i>m</i> -Phenylene-diamine	D
455	Columbia Black B	I '14:—165,727	Dianisidine <i>m</i> -Tolylene-diamine (2 mols)	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	Dianisidine Salicylic Acid <i>m</i> -Phenylene-diamine	D

## Red Acid

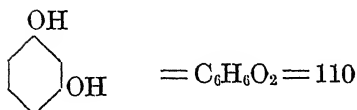
1: 5-Dihydroxy-naphthalene-3:7-disulfonic Acid (*not considered herein*)

## Resorcine

*See, Resorcinol (C. A. nomen.)*

**Resorcinol** (*C. A. nomen.*)

Resorcine



STATISTICS.—Imported '14:— 61,624 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:— 2,087 lbs.  
 Manufactured '19:— 96,397 lbs.  
 Manufactured '20:—139,315 lbs.

FORMATION.—Benzene is disulfonated with oleum, and the resulting benzene-*m*-disulfonic acid is fused with a large excess of caustic soda

LITERATURE.—Cain, Intermediate Products (2d Ed.), 130

**Dyes Derived from Resorcinol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
1	NITROSO DYE Solid Green O		[Dinitroso Derivative]	M
11	STILBENE DYE Mikado Orange Chloramine Orange G	I '14:— 26,010 M '17:— ? M '18:— ? M '19:— ? M '20:— 38,287	<i>p</i> -Nitro-toluene- <i>o</i> -sulfonic Acid (4 mols) [Resorcinol as reducing agent]	D
35	MONOAZO DYES Sudan G	I '14:— 798	Aniline	ss
60	Azo Phosphine GO	I '14:— 50	<i>m</i> -Amino-phenyl-trimethyl-ammonium Chloride	B
75	New Phosphine G	I '14:— 500	Amino-benzyl-dimethyl-amine	B

Dyes Derived from Resorcinol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
143	Chrysoine Tropaeoline	I '14:— 6,252 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Sulfanilic Acid	A
155	Acid Alizarin Garnet R	I '20:— 201 M '20:— ?	<i>o</i> -Amino-phenol- <i>p</i> - sulfonic Acid	M
	DISAZO DYES			
211	Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	<i>m</i> -Xylidine Sulfanilic Acid	A
213	Fast Brown	I '14:— 3,206 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid (2 mols)	A
222	Janus Yellow G	I '14:— 2,250 I '20:— 758	<i>m</i> -Nitro-aniline <i>m</i> -Amino-phenyl-tri- methyl-ammonium Chloride	B
317	Pyramidol Brown BG		Benzidine Resorcinol (2 mols)	D
374	Congo 4R Congo Red 4R	M '18:— ?	Tolidine Naphthionic Acid	D
376	Pyramidol Brown T		Tolidine Resorcinol (2 mols)	D
	TRISAZO DYES			
435	Janus Brown B		<i>p</i> -Amino-benzyl- diethyl-amine $\alpha$ -Naphthylamine	B

Dyes Derived from Resorcinol (*continued*)

Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
TRISAZO DYES ( <i>continued</i> )			
Isodiphenyl Black R		<i>p</i> -Phenylene-diamine (2 mols) Gamma Acid	D
Coomassie Union Blacks		1: 4-Naphthylene-diamine-2-sulfonic Acid Gamma Acid Resorcinol (2 mols)	D
Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:—229,489	Benzidine Sulfanilic Acid Salicylic Acid	D
Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Salicylic Acid	D
Azo Corinth		Tolidine Naphthionic Acid 3-Amino-phenol-4-sulfonic Acid	D
TETRAKISAZO DYE Hessian Brown BBN		Benzidine Sulfanilic Acid (2 mols) Resorcinol (2 mols)	D
XANTHONE DYES			
Rhodamine B	I '14:— 59,354 M '17:— ? M '18:— ? M '19:— ? I '20:— 24,709 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Phosphorus pentachloride; diethylamine]	B
Rhodamine 12 GF		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Formaldehyde; esterification]	B

Dyes Derived from Resorcinol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	XANTHONE DYES ( <i>continued</i> )			
580	Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic Anhydride Resorcinol (2 mols) Aniline or <i>p</i> -tol- uidine (2 mols) [PCl <sub>5</sub> ; sulfonation]	A
582	Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) <i>o</i> -Toluidine (2 mols) [PCl <sub>5</sub> ; sulfonation]	A
583	Acid Rosamine A	I '14:— 50 I '20:— 141	Phthalic Anhydride Resorcinol (2 mols) Mesidine (2 mols) [PCl <sub>5</sub> ; Sulfonation]	A
584	Fast Acid Blue R	I '14:— 4,022 I '20:— 130	3:6-Dichloro-phthalic Acid Resorcinol (2 mols) <i>p</i> -Phenetidine (2 mols) [PCl <sub>5</sub> ; Sulfonation]	A
585	Uranine Fluoresceine	I '14:— 2,273 M '17:— ? M '19:— ? I '20:— 10	Phthalic Anhydride Resorcinol (2 mols)	A
586	Chrysoline	I '20:— 1,402	Phthalic Anhydride Resorcinol (2 mols) Benzyl Chloride	A
587	Eosine	I '14:— 94,528 M '17:— 68,496 M '18:— 161,153 M '19:— 121,303 I '20:— 296 M '20:— 85,489	Phthalic Anhydride Resorcinol (2 mols) [Bromination] or [Fluoresceine brominated]	A

Dyes Derived from Resorcinol (*continued*)

Ultz ber Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
3	XANTHONE DYES ( <i>continued</i> ) Eosine Spirit Soluble Methyl Eosine		Phthalic anhydride Resorcinol (2 mols) [Bromination, methyla- tion] <i>or</i> [Eosine methyl ester]	SS
9	Eosine SP	I '14:— 2,315 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, ethyla- tion] <i>or</i> [Eosine ethyl ester]	SS
0	Eosine BN Acid Eosine	I '14:— 20,143 I '20:— 1,132 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Bromination, nitration] <i>or</i> [Dibromo-fluoresceine dinitrated]	A
1	Erythrosine G	I '14:— 99	Phthalic Anhydride Resorcinol (2 mols) [Iodation] <i>or</i> [Fluoresceine iodated]	A
2	Erythrosine B	I '14:— 4,350 M '17:— 505 M '18:— 1,636 M '19:— ? I '20:— 9 M '20:— 6,874	Phthalic Anhydride Resorcinol (2 mols) [Iodation] <i>or</i> [Fluoresceine iodated]	A
3	Phloxine P	I '14:— 2,244 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination]	

Dyes Derived from Resorcinol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	<b>XANTHONE DYES</b> ( <i>continued</i> )			
594	Cyanosine Spirit Soluble		3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Bromination, methyla- tion] <i>or</i> [Phloxine methyl ester]	A
595	Rose Bengal	I '14:— 2,277 M '20:— ?	3: 6-Dichloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
596	Phloxine	I '14:— 1,020	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Tetrachloro-phthalic Acid Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Tetrachloro-phthalic Acid Resorcinol (2 mols) [Ethylation] <i>or</i> [Phloxine ethylated]	ss
600	Coeruleine B	M '19:— ? M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) [Dehydration] [Fluoresceine dehydrated]	M
642	<b>OXAZINE DYES</b> Phenocyanine TC	I '20:— 4,740	Nitroso-dimethyl- aniline Gallic Acid <i>or</i> [Gallocyanine]	M



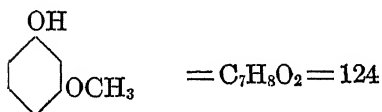
Dyes Derived from Resorcinol (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
643	OXAZINE DYES ( <i>continued</i> ) Phenocyanine T V	M '17 — I '20:— 1,543	Nitroso-dimethyl- aniline	M
			Gallic Acid [Sulfonation] or [Galloyanine; Sulfonation]	
644	Ultracyanine B		Nitroso-dimethyl- aniline Gallic Acid [Alkaline Condensation] or [Galloyanine alkaline condensation with resorcinol]	M
647	Nitroso Blue MR Resorcine Blue		Nitroso-dimethyl- aniline	MF
648	Iris Blue		Nitroso-resorcinol [Bromination]	A

**Resorcinol Methyl Ether**

Methyl-resorcinol

*m*-Methoxy-phenol (*C. A. nomen.*)



FORMATION.—From resorcinol by methylation

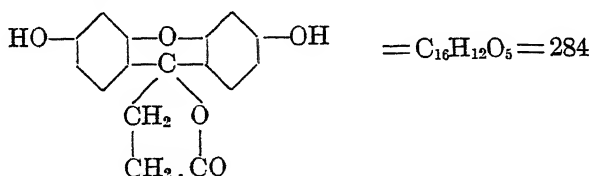
LITERATURE.—Ullmann, *Enzy. tech. Chemie*, **9**, 490

## Dye Derived from Resorcinol Methyl Ether

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
575	XANTHONE DYE Rhodine 12 GM		Dimethylamino-hydroxy-benzoyl-benzoic Acid [Ethyl esterification]	B

## Resorcinol-succinein

3:6-Dihydroxy-9-xanthene-propionic Acid;  $\gamma$ -Lactone (C. A. nomen.)



FORMATION.—From resorcinol and succinic acid (or its anhydride) by heating together at about 200° C.

LITERATURE.—Cohen, Theoretical Organic Chemistry (1918 Ed.), 461

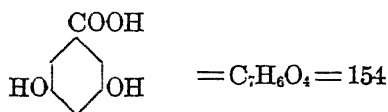
## Dye Derived from Resorcinol-succinein

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
570	XANTHONE DYE Rhodamine S	I '14:— 600 I '20:— 273	[Dimethyl-amine 2 mols]	A

 $\alpha$ -Resorcylic Acid (C. A. nomen.)

3:5-Dihydroxy-benzoic Acid

*m*-Dihydroxy-benzoic Acid



FORMATION.—From 3:5-disulfo-benzoic acid by caustic soda fusion

LITERATURE.—Lange, Zwischenprodukte, #881

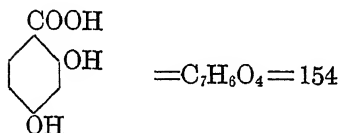
Ullmann, Enzy. tech. Chemie, 2, 345

**Dye Derived from  $\alpha$ -Resorcylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
771	ANTHRAQUINONE AND ALLIED DYES Resoflavine W		$\alpha$ -Resorcylic Acid (2 mols) [Oxidation]	M

**$\beta$ -Resorcylic Acid (*C. A. nomen.*)**

2:4-Dihydroxy-benzoic Acid



FORMATION.—By heating resorcinol with a solution of potassium bicarbonate under reflux

LITERATURE.—Ullmann, Enzy. tech. Chemie, 2, 345

Bistrzycki and Kostanecki, Ber. 18, 1984 (1885)

**Dye Derived from  $\beta$ -Resorcylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
49	MONOAZO DYE Prague Alizarin Yellow G		<i>m</i> -Nitro-aniline	M

**RG Acid**

See, 1-Naphthol-3:6-disulfonic Acid

**Rho Acid**

*See*, Anthraquinone-1: 5-disulfonic Acid

**Rumpff Acid**

*See*, Croceine Acid

**S Acid**

*See*, 1-Amino-S-naphthol-4-sulfonic Acid

*See*, 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid

*See*, 1-Naphthylamine-S-sulfonic Acid

*See*, 1-Naphthylamine-4: 8-disulfonic Acid

1-Naphthol-S-sulfonic Acid (*not considered herein*)

1: 8-Dihydroxy-naphthalene-2: 4-disulfonic Acid (*not considered herein*)

1: 7-Dihydroxy-naphthalene-6-carboxylic Acid (*not considered herein*)

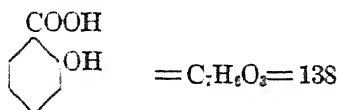
*Note.*—The use of *S* as a trivial name is very confusing and should be avoided

**2S Acid**

*See*, 1-Amino-S-naphthol-2: 4-disulfonic Acid

**Salicylic Acid**

*o*-Hydroxy-benzoic Acid



*Technical*  
lbs.

*U. S. P.*  
lbs.

STATISTICS.—Manufactured '17:—	960,339	2,495,285
Manufactured '18:—	1,395,630	3,270,462
Manufactured '19:—	3,467,055	2,619,726
Manufactured '20:—	3,914,163	2,663,494

**FORMATION.**—Phenol is treated with caustic soda, dried and powdered; and then subjected to action of carbon dioxide under pressure and at 100–145°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 149  
 Lange, Zwischenprodukte, #145, 471–475, 479

Dyes Derived from Salicylic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
48	MONOAZO DYES Alizarin Yellow GG	I '14:—144,761 M '17:— 1,452,622 M '18:— 2,233,208 M '19:—163,170 M '20:—211,580	<i>m</i> -Nitro-aniline	M
58	Alizarin Yellow R	I '14:— 97,059 M '17:—215,468 M '18:—385,910 M '19:—130,424 I '20:— 860 M '20:— 83,334	<i>p</i> -Nitro-aniline or Aniline [with nitration after coupling]	M
96	Chrome Fast Yellow GG	I '14:— 150 I '20:— 500	<i>o</i> -Anisidine or <i>m</i> -Amino- <i>p</i> -cresol Methyl Ether	M
102	Diamond Flavine G	I '14:— 23,089 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine	M
103	Dutch Yellow		Benzidine [Sodium sulfite]	M
133	Eriochrome Phosphine R	I '14:— 1,433	<i>p</i> -Nitro-aniline- <i>o</i> - sulfonic Acid	ACr
177	Chrome Yellow D Mordant Yellow O	I '14:—129,651 M '17:— ? M '18:— 32,011 M '19:— ? I '20:— 1,389 M '20:— ?	Broenner's Acid	M

Dyes Derived from Salicylic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
178	Crumpsall Yellow		Amino-G Acid	A
199	Oriol Yellow Cotton Yellow R	I '14:— 13,416 I '20:— 125 M '20:— ?	Dehydrothio- <i>p</i> -tolui- dine-sulfonic Acid or Primuline	D
204	Diamond Yellow G		<i>m</i> - or <i>p</i> -Amino-benzoic Acid	M
	DISAZO DYES			
221	Anthracene Acid Brown G	M '17:— ? M '18:— ? I '20:— 225	Sulfanilic Acid <i>p</i> -Nitro-aniline	ACr
250	Milling Orange	I '14:— 4,370	Amino-azo-benzene- sulfonic Acid	M
291	Azo Alizarin Bordeaux W		<i>p</i> -Phenylene-diamine Nevile-Winther's Acid	M
292	Azo Alizarin Black I		<i>p</i> -Phenylene-diamine Chromotropic Acid	M
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678 I '20:— 887	Thio-aniline Salicylic Acid (2 mols)	A ACr
296	Cotton Yellow G	I '14:— 31,472 I '20:— 4,651	<i>p</i> -Amino-acetanilide (2 mols) Salicylic Acid (2 mols) Phosgene	D
305	Hessian Yellow		Diamino-stilbene-disul- fonic Acid Salicylic Acid (2 mols)	D
339	Brilliant Orange G	I '14:— 6,321 M '17:— ?	Benzidine 3-Amino-phenol-4- sulfonic Acid	D

Dyes Derived from Salicylic Acid (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	DISAZO DYES (continued)			
340	Benzo Orange R	I '14:— 1,073 M '17:— ? M '18:— 50,422 M '19:— 42,807 I '20:— 220 M '20:— 86,210	Benzidine Naphthionic Acid	D
340	Chlorazol Orange 2R		Benzidine 2-Naphthylamine-7- sulfonic Acid	D
341	Crumpsall Direct Fast Red R	M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Benzidine R Salt	D
342	Chrysamine G	I '14:— 608 M '17:— 26,061 M '18:— 28,846 M '19:— 54,279 I '20:— 9,810 M '20:— 49,342	Benzidine Salicylic Acid (2 mols)	D
343	Diamine Fast Red F	I '14:— 50,479 M '19:— 56,864 I '20:— 4,040 M '20:— 115,865	Benzidine Gamma Acid [Acid coupling]	D
344	Diamine Brown M	I '14:— 65,396 M '18:— ? M '19:— 15,959 M '20:— 257,872	Benzidine Gamma Acid [Alkaline coupling]	D
345	Oxamine Maroon		Benzidine 1-Amino-5-naphthol-7- sulfonic Acid	D
346	Oxamine Red	I '14:— 11,636 I '20:— 848	Benzidine J Acid	D

Dyes Derived from Salicylic Acid (*continued*)

<i>Schulz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
347	Diphenyl Brown RN		Benzidine Methyl-gamma Acid	D
348	Diphenyl Brown BN	I '14:— 13,471	Benzidine Dimethyl-gamma Acid	D
349	Diamine Brown B	I '20:— 24	Benzidine Phenyl-gamma Acid	D
350	Alkali Yellow R		Benzidine Dehydrothio- <i>p</i> -tolui- dine-sulfonic Acid	D
355	Anthracene Red	I '14:— 3,873 M '19:— ? I '20:— 104 M '20:— ?	<i>o</i> -Nitro-benzidine Nevile-Winther's Acid	ACr
393	Diphenyl Brown 3GN	M '20:— ?	Tolidine Dimethyl-gamma Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Tolidine Salicylic Acid (2 mols)	D
404	Diamine Yellow N	M '17:— ? I '20:— 313	Ethoxy-benzidine Phenol [Ethylation]	D
	TRISAZO DYES			
444	Crumpsall Direct Fast Brown B		Benzidine Aniline Gamma Acid	D
445	Crumpsall Direct Fast Brown O		Benzidine Aniline Phenyl-gamma Acid	D
446	Benzo Olive	I '14:— 1,149	Benzidine $\alpha$ -Naphthylamine H Acid	D



Dyes Derived from Salicylic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES ( <i>continued</i> )			
447	Benzo Gray S	I '14:— 802	Benzidine $\alpha$ -Naphthylamine Neville-Winther's Acid	-D
448	Diamine Bronze G	I '14:— 4,495	Benzidine <i>m</i> -Phenylene-diamine H Acid	D
449	Trisulfon Brown B	I '14:— 16,781 I '20:— 38,616	Benzidine <i>m</i> -Phenylene-diamine 2R Acid	D
454	Trisulfon Brown G	I '14:— 1,323	Tolidine <i>m</i> -Phenylene-diamine 2R Acid	D
457	Trisulfon Brown GG	I '14:— 7,562 I '20:— 38,411	Dianisidine <i>m</i> -Phenylene-diamine 2R Acid	D
465	Columbia Black Green D		Benzidine 1-Amino-8-naphthol-4- sulfonic Acid Aniline	D
466	Eboli Green		Benzidine Sulfanilic Acid 1-Amino-8-naphthol- 3:5-disulfonic Acid	D
468	Diphenyl Green 3G		Benzidine H Acid <i>o</i> -Chloro- <i>p</i> -nitro- aniline	D
475	Diamine Green G Oxamine Green G	I '14:— 7,329 M '17:— ? M '18:— 29,118 M '19:— 136,638 I '20:— 1,332 M '20:— 52,292	Benzidine H Acid <i>p</i> -Nitro-aniline	D

Dyes Derived from Salicylic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES ( <i>continued</i> )			
476	Benzamine Brown 3GO	I '14:— 16,988 M '17:— ? M '18:— ? M '19:— ? M '20:— 623,757	Benzidine Sulfanilic Acid <i>m</i> -Phenylene-diamine	D
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:— 229,489	Benzidine Sulfanilic Acid Resorcinol	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Sulfanilic Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
480	Congo Brown R	I '14:— 3,045	Benzidine Laurent's Acid Resorcinol	D
482	Alizarin Yellow FS		Aniline and <i>o</i> -Toluidine <i>p</i> -Toluidine Salicylic Acid (3 mols) or [Fuchsine and Salicylic Acid]	M
	TRIPHENYL-METHANE DYES			
510	Azo Green		<i>m</i> -Amino-tetramethyl- <i>p</i> : <i>p'</i> -diamino-tri- phenyl-methane or from <i>m</i> -Nitro-benzaldehyde and dimethyl-aniline (2 mols) [Oxidation]	M

Dyes Derived from Salicylic Acid (*continued*)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
549	Chrome Violet	I '14:— 51	Hydrol [Oxidation]	M
557	Chrome Violet	I '14:— 220 M '18:— ?	Salicylic Acid (3 mols) [Formaldehyde and sulfuric Acid]	M

Schaeffer's  $\alpha$  Acid

1-Naphthol-2-sulfonic Acid (*not considered herein*)

Schaeffer's Acid<sup>1</sup>

Schaeffer's  $\beta$  Acid

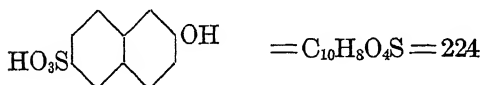
2-Naphthol-6-sulfonic Acid (*C. A. nomen.*)

$\beta$ -Naphthol-sulfonic Acid S

$\beta$ -Naphthol-sulfonic Acid Schaeffer

$\beta$ -Naphthol- $\alpha$ -sulfonic Acid of *Armstrong and Schultz*

$\beta$ -Naphthol- $\beta$ -sulfonic Acid



STATISTICS.—Manufactured '17:—1,108,049 lbs.<sup>2</sup>

Manufactured '18:— 169,383 lbs.

Manufactured '19:— 146,111 lbs.

Manufactured '20:— 475,243 lbs.

FORMATION.—By sulfonation of  $\beta$ -naphthol, and separation from the Croceine acid formed simultaneously

<sup>1</sup> Schaeffer's Acid is very occasionally used when referring to 1-Naphthol-2-sulfonic acid, but this is more properly known as Schaeffer's  $\alpha$  acid.

<sup>2</sup> Includes Croceine Acid.

LITERATURE.—Cain, Intermediate Products (2d Ed.), 223

Lange, Zwischenprodukte, #2430–2432

Thorpe, Dic. Chemistry, 3, 624

**Dyes Derived from Schaeffer's Acid**

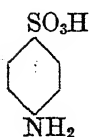
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
4	MONOAZO DYES Naphthol Green	I '14:— 19,146 M '17:— 75,850 M '18:— 22,465 M '19:— 34,646 I '20:— 100 M '20:— ?	[Nitroso-Derivative]	A
37	Ponceau 4GB Croceine Orange	I '14:— 13,046 M '17:— ? M '18:— 30,824 M '19:— 17,274 M '20:— 96,573	Aniline	A
70	Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Toluidine	A
79	Brilliant Orange R Xylidine Orange RR	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Xylidine	A
111	Fast Red BT	M '17:— ? M '18:— ? M '19:— ?	$\alpha$ -Naphthylamine	A
123	Emine Red		Isodehydro-thio- <i>m</i> - xylidine	A
166	Fast Red E	I '14:— 2,473 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Naphthionic Acid	A

Dyes Derived from Schaeffer's Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
196	Titian Red	I '14:— 886 M '19:— ? M '20:— ?	Dehydro-thio- <i>p</i> -tolui- dine-sulfonic Acid	D
197	Thiazine Red G	I '14:— 4,861 M '18:— ? M '19:— 11,886 M '20:— 13,988	Primuline	D
201	Pigment Scarlet G	M '17:— ? M '18:— ? M '19:— ?	Anthranilic Acid	CL
	DISAZO DYES			
234	Cloth Red G	I '14:— 554	<i>o</i> -Amino-azo-toluene	M
237	Bordeaux BX		Amino-azo-xylene	A
243	Coomassie Wool Black R		Acetyl- <i>p</i> -phenylene- diamine $\alpha$ -Naphthylamine	A
248	Fast Scarlet B	I '14:— 1,755	Amino-azo-benzene- sulfonic Acid	A
254	Bordeaux G		Amino-azo-toluene- sulfonic Acid	A
273	Diaminogene Blue BB	I '14:— 8,308 M '17:— ? I '20:— 5,936	Acetyl-1:4-naphthyl- ene-diamine-6-sul- fonic Acid $\alpha$ -Naphthylamine	D
289	Acid Alizarin Black SN Palatine Chrome Black S	M '17:— ? M '18:— ? M '19:— ?	2:6-Diamino-1-phenol- 4-sulfonic Acid $\beta$ -Naphthol	ACr
293	Milling Red G	I '14:— 699 I '20:— 200	Thioaniline Schaeffer's Acid (2 mols)	A

Dyes Derived from Schaeffer's Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
645	OXAZINE DYE Gallazine A		Nitroso-dimethyl-aniline Gallic Acid [Oxidation]	M

**Schoellkopf's Acid***See, 1-Naphthol-4: 8-disulfonic Acid**1-Naphthylamine-4: 8-disulfonic Acid**1-Naphthylamine-8-sulfonic Acid**Also used for 1-Naphthol-8-sulfonic Acid, which is not here indexed, but the intermediate generally referred to is that one listed first above***Semi-naphthalidam***1: 5-Diamino-naphthalene (not considered herein)***Siver Salt (Sodium derivative)***See, Anthraquinone-2-sulfonic Acid***SS Acid or 2S Acid***See, 1-Amino-8-naphthol-2: 4-disulfonic Acid***m-Sulfanilic Acid***See, Metanilic Acid***Sulfanilic Acid (C. A. nomen.  $SO_3H = 1$ )***p*-Amino-benzene-sulfonic acid*Aniline-p*-sulfonic acid

$$= C_6H_7NO_3S = 173$$

STATISTICS.—Imported '14:— 4,477 lbs.  
 Manufactured '17:—1,184,412 lbs.  
 Manufactured '18:—1,247,478 lbs.  
 Manufactured '19:—1,023,861 lbs.  
 Manufactured '20:—1,796,838 lbs.

FORMATION.—From aniline by heating with sulfuric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 47  
 Lange, Zwischenprodukte, #615–620

**Dyes Derived from Sulfanilic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
22	PYRAZOLONE DYES Xylene Yellow 3G	I '14:— 23,074	1-(2:5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone	A
		I '20:— 77,782		
23	Tartrazine	I '14:—272,477	<i>p</i> -Phenyl-hydrazine-sulfonic Acid	A
		M '17:— ?		
		M '18:— ?		
		M '19:— ?		
		I '20:— 47,877		
		M '20:—701,722		
138	MONOAZO DYES Helianthine Methyl Orange	I '14:— 500	Dimethyl-aniline	A
		M '18:— ?		
		M '19:— ?		
		M '20:— ?		
139	Orange IV	I '14:— 19,020	Diphenylamine	A
		M '19:— ?		
		I '20:— 608		
140	Azoflavine RS Curcumeine	I '14:— 39,869	Diphenylamine [Nitration]	A
		I '20:— 5,225		
141	Azo Yellow 3G	I '14:—114,689	Diphenylamine [Strong nitration]	A
		M '17:— ?		
		M '18:— ?		
		M '19:— ?		
		I '20:— 4,818		
		M '20:— ?		

Dyes Derived from Sulfanilic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
142	Brilliant Yellow S Curcumine	I '14:— 9,934	Diphenylamine [Sulfonation]	A
143	Chrysoine Tropoeoline	I '14:— 6,252 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Resorcinol	A
144	Orange I	I '14:— 8,305 M '17:— ? M '18:— ? M '19:— ? I '20:— 1,323 M '20:— 14,684	$\alpha$ -Naphthol	A
145	Orange II	I '14:—128,877 M '17:—712,586 M '18:—916,890 M '19:— 1,133,925 I '20:— 2,265 M '20:— 1,850,341	$\beta$ -Naphthol	A
146	Azo Fuchsine G	I '14:— 17,819 I '20:— 3,694	1: 8-Dihydroxy-naph- thalene-4-sulfonic Acid	A
147	Azo Fuchsine 6B	I '14:— 13,206 M '17:— ? M '18:— ?	1: 8-Dihydroxy-naph- thalene-4-sulfonic Acid [? Classification]	A
211	DISAZO DYES Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	<i>m</i> -Xylidine Resorcinol	A



Dyes Derived from Sulfanilic Acid (continued)

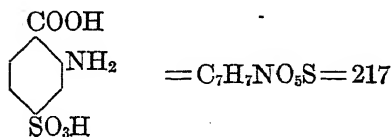
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
212	Fast Brown G Acid Brown G	I '14:— 17,407 I '20:— 485	$\alpha$ -Naphthol Sulfanilic Acid (2 mols)	A
220	Palatine Black A Buffalo Black PY	I '14:—299,274 I '20:— 200	1-Amino-8-naphthol-4- sulfonic Acid $\alpha$ -Naphthylamine	A
221	Anthracene Acid Brown G	M'17:— ? M'18:— ? I '20:— 225	<i>p</i> -Nitro-aniline Salicylic Acid	ACr
259	Ponceau 10 RB	I '14:— 201	<i>o</i> -Anisidine Croceine Acid	A
260	Eriochrome Verdone A	I '14:— 882	<i>m</i> -Amino- <i>p</i> -cresol $\beta$ -Naphthol	ACr
261	Buffalo Black 10B	M'17:— ? M'18:— ? M'19:— ? M'20:— ?	$\alpha$ -Naphthylamine H Acid	A
262	Victoria Black B	I '14:— 557	$\alpha$ -Naphthylamine 1: 8-Dihydroxy-naph- thalene-4-sulfonic Acid	A
466	TRISAZO DYES Eboli Green		Benzidine Salicylic Acid 1-Amino-8-naphthol- 3: 5-disulfonic Acid	D
476	Benzamine Brown 3 GO	I '14:— 16,988 M'17:— ? M'18:— ? M'19:— ? M'20:—623,757	Benzidine <i>m</i> -Phenylene-diamine Salicylic Acid	D

Dyes Derived from Sulfanilic Acid (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
477	Congo Brown G Naphthamine Brown 4G	I '14:— 52,141 M '17:— ? M '18:— ? M '19:— ? I '20:— 443 M '20:— 229,489	Benzidine Resorcinol Salicylic Acid	D
478	Columbia Green	I '14:— 45,162 M '18:— ? I '20:— 7,555	Benzidine Salicylic Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
	TETRAKISAZO DYES			
485	Benzo Brown G	I '14:— 41,905 M '17:— ? M '18:— ? M '19:— 83,506 I '20:— 2,286 M '20:— 109,648	<i>m</i> -Phenylene-diamine (3 mols) Sulfanilic Acid (2 mols)	D
489	Hessian Brown BBN		Benzidine Resorcinol (2 mols) Sulfanilic Acid (2 mols)	D
	SULFUR DYE			
738	Cotton Black		1-Chloro-2: 4-dinitro- benzene [S plus Na <sub>2</sub> S]	S

*p*-Sulfo-anthranilic Acid (*C. A. nomen.*)

2-Amino-4-sulfo-benzoic Acid

*o*-Amino-*p*-sulfo-benzoic Acid

FORMATION.—*o*-Nitro-toluene is sulphonated with oleum. The resulting *o*-nitro-toluene-*p*-sulfonic acid is converted into the sodium salt and heated with a 40 per cent caustic soda solution at 90–95°

LITERATURE.—Lange, Zwischenprodukte, #855

### Dye Derived from *p*-Sulfo-anthranilic Acid

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
28	PYRAZOLONE DYE Pigment Fast Yellow G	M '19:— ? I '20:— 170	3-Methyl-1-phenyl-5-pyrazolone	CL

### Sulfo-naphthalic Acid

Naphthalene-1-sulfonic Acid (*not considered herein*)

### $\beta$ -Sulfonic Acid

*See*, Anthraquinone-2-sulfonic Acid

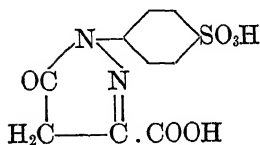
### 1-(*p*-Sulfo-phenyl)-3-methyl-5-pyrazolone

*See*, 3-Methyl-1-(*p*-sulfo-phenyl)-5-pyrazolone

### 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid

Tartrazinogen-sulfonic Acid

5-Keto-1-(*p*-sulfo-phenyl)-3- $\Delta^2$ -pyrazoline-carboxylic Acid (*C. A. nomen.*)



FORMATION.—By condensation of phenyl-hydrazine-*p*-sulfonic acid and ethyl oxalacetate

LITERATURE.—Cain, Intermediate Products (2d Ed.), 168

Lange, Zwischenprodukte, #138

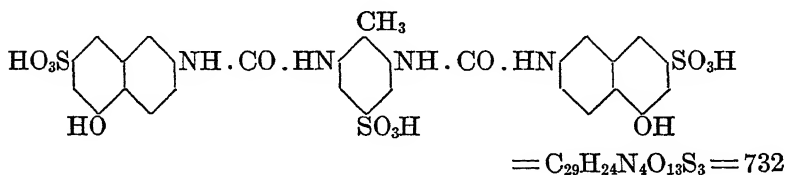
**Dye Derived from 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
20	PYRAZOLONE DYE Flavazine S	I '14:— 81,375 I '20:— 1,500	Aniline	A

**Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)**

Sulfo-*m*-tolylene-diamine-dicarbonyl-dihydroxy-dinaphthylamine-disulfonic Acid

3: 5-Bis[ $\beta$ -(5-hydroxy-7-sulfo-2-naphthyl)-carbamido]-*p*-toluene-sulfonic Acid (*C. A. nomen.*)



FORMATION.—By condensation of tolylene-diamine-sulfonic acid ( $\text{CH}_3\text{:NH}_2\text{:NH}_2\text{:SO}_3\text{H} = 1:2:6:4$ ) with two molecules of J acid (2-amino-5-naphthol-7-sulfonic acid), by means of phosgene ( $\text{COCl}_2$ )

LITERATURE.—Ger. Pat. 236,594, Frdl. 10, 904

Lange, Zwischenprodukte, #2912

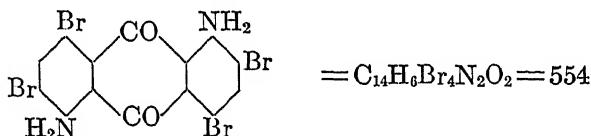
**Dyes Derived from Sulfo-*m*-tolylene-diamine-bis-(carbonyl-amino-naphthol-sulfonic Acid)**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
280	DISAZO DYES Azidine Fast Scarlet GGS		<i>o</i> -Toluidine (2 mols)	D
281	Azidine Fast Scarlet 4BS		<i>o</i> -Toluidine $\beta$ -Naphthylamine	D
282	Azidine Fast Scarlet 7BS		$\beta$ -Naphthylamine (2 mols)	D

**Tartrazinogen-sulfonic Acid**

*See, 1-(*p*-Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid*

**2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone**



FORMATION.—By bromination of 1:5-diamino-anthraquinone

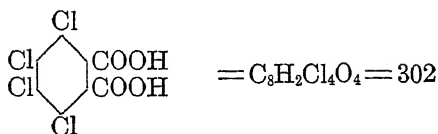
LITERATURE.—Scholl and Berblinger, Ber. **37**, 4180 (1904)

Barnett, Anthracene and Anthraquinone, 229

*Cf.* Lange, Zwischenprodukte, #3231, 3404, 3405

**Dye Derived from 2:4:6:8-Tetrabromo-1:5-diamino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
861	ANTHRAQUINONE AND ALLIED DYES Anthraquinone Blue SR	I '20:— 917	Aniline (2 mols) [Sulfonation]	ACr

**Tetrachloro-phthalic Acid**

STATISTICS.—Imported '14:—1,102 lbs.

FORMATION.—Phthalic anhydride is warmed for some hours at 200° with 6 parts of antimony pentachloride, and chlorine is conducted through the molten mass for from 8 to 12 hours

LITERATURE.—Lange, Zwischenprodukte, #1184

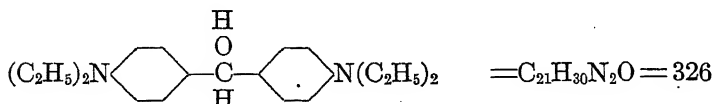
**Dyes Derived from Tetrachloro-phthalic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
596	XANTHONE DYES Phloxine	I '14:— 1,020	Resorcinol (2 mols) [Bromination]	A
597	Rose Bengal B	I '14:— 1,354 M '17:— ? M '18:— ? M '19:— ?	Resorcinol (2 mols) [Iodation]	A
598	Cyanosine B		Resorcinol (2 mols) [Bromination; Ethylation] or [Phloxine ethylated]	ss

*p*: *p'*-Tetraethyl-diamino-benzohydrol

*p*: *p'*-Tetraethyl-diamino-diphenyl-carbinol

*p*: *p'*-Bis(diethylamino)-benzohydrol (*C. A. nomen.*)



FORMATION.—Diethyl-aniline is condensed with formaldehyde in the presence of hydrochloric acid to tetraethyl-diamino-diphenyl-methane. This body is now oxidized to the hydrol with lead peroxide

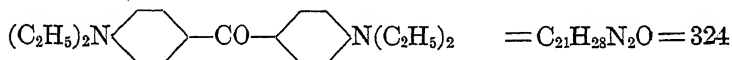
LITERATURE.—Lange, Zwischenprodukte, #1354

**Dye Derived from *p*: *p*'-Tetraethyl-diamino-benzohydrol**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
498	TRIPHENYL-METHANE DYE Turquoise Blue	I '14:— 1,541 I '20:— 1,407	<i>p</i> -Nitro-toluene [Oxidation]	B

*p*: *p*'-Tetraethyl-diamino-benzophenone

*p*: *p*'-Bis(diethylamino)-benzophenone (*C. A. nomen.*)

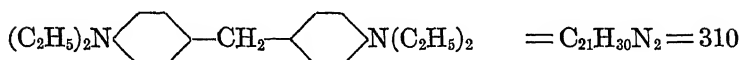


FORMATION.—By condensation of diethyl-aniline (2 mols) and phosgene (carbonyl chloride)

LITERATURE.—Lange, Zwischenprodukte, #1382

**Dyes Derived from *p*: *p*'-Tetraethyl-diamino-benzophenone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
518	TRIPHENYL-METHANE DYES Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B
532	Alkali Violet 6B	I '14:— 3,020	Methyl-diphenyl-amine [Sulfonation]	A
560	DIPHENYL-NAPHTHYL-METHANE DYE Night Blue	I '14:— 361 M '19:— ? I '20:— 11	<i>p</i> -Tolyl- $\alpha$ -naphthyl-amine	B

***p*: *p*'-Tetraethyl-diamino-diphenyl-carbinol***See, p*: *p*'-Tetraethyl-diamino-benzohydrol***p*: *p*'-Tetraethyl-diamino-diphenyl-methane***p*: *p*'-Methylene-bis-[*N*: *N*-diethyl-aniline] (*C. A. nomen.*)

FORMATION.—By condensation of diethyl-aniline with formaldehyde in the presence of hydrochloric acid

LITERATURE.—*Cf.* Cain, Intermediate Products (2d Ed.), 102

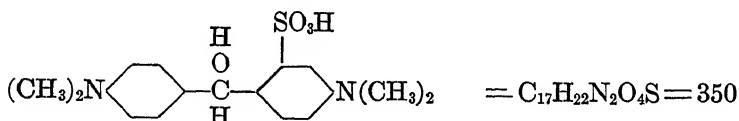
*Cf.* Lange, Zwischenprodukte, #1301

**Dye Derived from *p*: *p*'-Tetraethyl-diamino-diphenyl-methane**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
518	TRIPHENYL-METHANE DYE Ethyl Violet Ethyl Purple	I '14:— 51,933	Diethyl-aniline	B

**1: 3: 5: 7-Tetrahydroxy-anthraquinone***See, Anthrachrysone***Tetramethyl-diamino-benzohydrol***See, Hydrol****p*: *p*'-Tetramethyl-diamino-benzohydrol-sulfonic Acid**

5-Dimethylamino- $\alpha$ -(*p*-dimethylamino-phenyl)- $\alpha$ -hydroxy-*o*-toluene-sulfonic Acid (*C. A. nomen.*)





FORMATION.—Tetramethyl-diamino-diphenyl-methane (from condensation of dimethyl-aniline and formaldehyde) is dissolved in monohydrate and sulfonated with 25 per cent oleum at 110°. This methane-sulfonic acid is now oxidized with lead peroxide to the hydrol derivative

LITERATURE.—Ger. Pat. 88085; Frdl. 4, 219

Cain, Intermediate Products (2d Ed.), 102

Lange, Zwischenprodukte, #1312

Georgievics and Grandmougin, Dye Chemistry, 208

**Dye Derived from Tetramethyl-diamino-benzohydrol-sulfonic Acid**

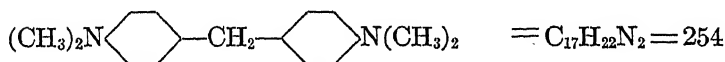
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
531	TRIPHENYL-METHANE DYE Eriocyanine A	I '14:— 25,091 I '20:— 8,223 M '20:— ?	Dibenzyl-aniline-sulfonic [or disulfonic] Acid [Oxidation]	A

**Tetramethyl-diamino-benzophenone**

*See, Ketone*

*p*: *p'*-Tetramethyl-diamino-diphenyl-methane

*p*: *p'*-Methylene-bis-[*N*: *N*-dimethyl-aniline] (*C. A. nomen.*)



STATISTICS.—Manufactured '20:— ?

FORMATION.—From dimethyl-aniline (2 mols) by condensing with formaldehyde in the presence of hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 102

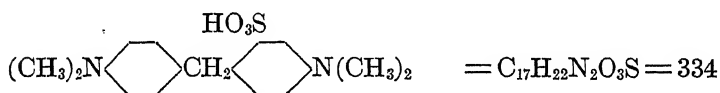
Lange, Zwischenprodukte, #1301

Dyes Derived from *p*: *p'*-Tetramethyl-diamino-diphenyl-methane

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
493	AURAMINES Auramine	I '14:—449,276 M '17:— ? M '18:— 45,634 M '19:—127,567 I '20:— 74,414 M '20:— ?	[Sulfur and ammonia]	B
603	ACRIDINE DYE Acridine Orange NO	I '14:— 2,336 I '20:— 1,925	[Dinitration, Reduction] [Ammonia Removal, Oxidation]	B

*p*: *p'*-Tetramethyl-diamino-diphenylmethane-sulfonic Acid

6-(*p*-Dimethylamino-benzyl)-*N*: *N*-dimethyl-metanilic Acid (C.A. nomen.)



FORMATION.—By sulfonation of tetramethyl-diamino-diphenylmethane; or by condensation of dimethyl-metanilic acid and dimethyl-aniline with formaldehyde

LITERATURE.—Lange, *Zwischenprodukte*, #1312

Cain, *Intermediate Products* (2d Ed.), 102

Georgievics and Grandmougin, *Dye Chemistry*, 208

USES.—For preparation of *p*: *p'*-tetramethyl-diamino-benzohydrol-sulfonic acid

*N'*: *N'*: *N''*: *N''*-Tetramethyl-*m*: *p'*: *p''*-methenyl-trisaniline (C.A. nomen.)

See, *m*-Amino-tetramethyl-*p'*: *p''*-diamino-triphenyl-methane

**$\alpha$ -Tetranitro-naphthalene**

From 1:5-Dinitro-naphthalene

**$\beta$ -Tetranitro-naphthalene**

1:3:6:8-Tetranitro-naphthalene (*not considered herein*)

**$\gamma$ -Tetranitro-naphthalene**

1:3:5:8-Tetranitro-naphthalene (*not considered herein*)

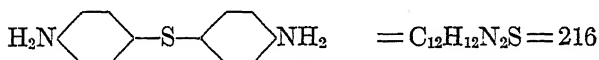
**$\delta$ -Tetranitro-naphthalene**

1:2:5:8-Tetranitro-naphthalene (*not considered herein*)

**Thioaniline**

*p*: *p'*-Thio-bisaniline (*C. A. nomen.*)

*p*: *p'*-Diamino-diphenyl-sulfide



FORMATION.—From aniline by heating with sulfur in presence of lead oxide

LITERATURE.—Meyer-Jacobson, *Organische Chemie* (1902), II, 1, 476

**Dyes Derived from Thioaniline**

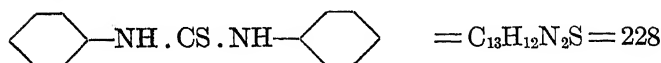
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
293	DISAZO DYES Milling Red G	I '14:— 699	Schaeffer's Acid (2 mols)	A
		I '20:— 200		
294	Anthracene Yellow C Fast Mordant Yellow	I '14:— 3,678	Salicylic Acid (2 mols)	A ACr
		I '20:— 887		

*p*: *p'*-Thio-bisaniline (*C. A. nomen.*)

See, Thioaniline

**Thio-carbanilide** (*C. A. nomen.*)

Diphenyl-thiourea



STATISTICS.—Manufactured '17:— ?

Manufactured '18:—1,326,236 lbs.

Manufactured '19:—2,268,375 lbs.

Manufactured '20:—2,226,807 lbs.

FORMATION.—From aniline by action of carbon disulfide

LITERATURE.—Ullmann, *Enzy. tech. Chemie*, 6, 304**Dyes Derived from Thio-carbanilide**

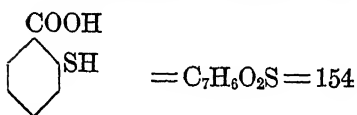
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
874	INDIGO GROUP DYES Indigo	I '14:— 8,507,359 M '17:—274,771 M '18:— 3,083,888 M '19:— 8,863,824 I '20:—520,347 M '20:— 18,178,231	Thio-carbanilide (2 mols) [KCN, etc.]	V
876	Indigo MLB Indigo White		Thio-carbanilide (2 mols) [KCN, etc.; Reduction] or [Indigo Reduced]	V
877	Indigotine	I '14:— 19,329 M '17:— 1,876,787 M '18:— 1,434,703 M '19:— 1,699,670 I '20:— 5,512 M '20:— 1,395,000	Thio-carbanilide (2 mols), etc. or [Indigo Sulfonated]	A

Dyes Derived from Thio-carbanilide (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
878	Indigotine P		Thio-carbanilide (2 mols), etc. or [Indigo Sulfonated]	A
879	Brom Indigo Rathjen	I '14:— 53,610 M '20:— ?	Thio-carbanilide (2 mols), etc. or [Indigo Brominated]	V
880	Helindone Blue BB Indigo RB	I '14:— 6,856 M '17:— 14,100 I '20:— 3,691 M '20:— ?	Thio-carbanilide (2 mols), etc. or [Indigo, Brominated]	V
881	Dianthrene Blue 2B Bromo Indigo FB Ciba Blue 2B	I '14:— 16,880 M '19:— ? I '20:— 35,857	Thio-carbanilide (2 mols), etc. or [Indigo, Brominated]	V
882	Indigo MLB/5B Ciba Blue G	I '14:— 1,356 I '20:— 1,008	Thio-carbanilide (2 mols), etc. or [Indigo, Brominated]	V
883	Indigo MLB/6B Indigo KG	I '14:— 3,191 I '20:— 4,130 M '20:— ?	Thio-carbanilide (2 mols), etc. or [Indigo, Brominated]	V
884	Brilliant Indigo BASF/2B	I '14:— 4,518	Thio-carbanilide (2 mols), etc. or [Indigo, Chlorinated Brominated]	V
885	Brilliant Indigo BASF/B	I '14:— 8,175 I '20:— 3,503	Thio-carbanilide (2 mols), etc. or [Indigo Chlorinated]	V

Dyes Derived from Thio-carbanilide (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Applica- tion Class</i>
	INDIGO GROUP DYES ( <i>continued</i> )			
886	Brilliant Indigo BASF/G	I '14:— 12,057	Thio-carbanilide (2 mols), etc. or [Indigo Chlorinated, Brominated]	V
889	Indigo Yellow 3G		Thio-carbanilide (2 mols), etc. Benzoyl Chloride or [Indigo, Benzoyl Chloride]	V
890	Ciba Yellow G	I '14:— 48	Thio-carbanilide (2 mols), etc. Benzoyl Chloride [Bromination] or [Indigo Yellow 3G, Brominated]	V

**Thio-indoxyl***See*, 2-Hydroxy-thionaphthene**Thio-indoxyl-carboxylic Acid***See*, 2-Hydroxy-thionaphthene-1-carboxylic Acid**o-Thiol-benzoic Acid***See*, Thio-salicylic Acid**Thio-salicylic Acid***o*-Mercapto-benzoic Acid (*C. A. nomen.*)*o*-Thiol-benzoic AcidThiophenol-*o*-carboxylic Acid

FORMATION.—(1) From *o*-chloro-benzoic acid by reaction with potassium hydrogen sulfide. (2) From anthranilic acid by diazotizing and then running into a solution of sodium polysulfide and sodium hydroxide

LITERATURE.—Cain, Intermediate Products (2d Ed.), 151  
Lange, Zwischenprodukte, #507-510

**Dyes Derived from Thio-salicylic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
912	INDIGO GROUP DYES Thio Indigo Red B	I '14:— 1,102 I '20:— 275	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.]	V
919	Ciba Bordeaux B	I '14:— 899 I '20:— 1,786	Thio-salicylic Acid (2 mols) [Chloro-acetic Acid 2 mols; etc.; Bromi- nation] or [Thio Indigo Red, brominated]	V

**Tobias Acid**

*See*, 2-Naphthylamine-1-sulfonic Acid

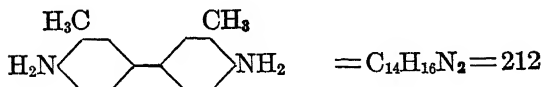
*Also applied to*, 2-Naphthol-1-sulfonic Acid

**Tolidine**

*See*, *o*-Tolidine

***o*-Tolidine** (*C. A. nomen.*)

Tolidine



STATISTICS.—Imported '14:— 5,874 lbs.  
 Manufactured '17:— ?  
 Manufactured '18:— ?  
 Manufactured '19:—143,012 lbs.  
 Manufactured '20:—375,905 lbs.

FORMATION.—From *o*-nitro-toluene by reduction with zinc dust and hydrochloric acid, and conversion of the hydrazo-toluene into tolidine by boiling with hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 95  
 Lange, Zwischenprodukte, #1204, 1216

### Dyes Derived from *o*-Tolidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
338	DISAZO DYES Naphthamine Blue 3B	I '14:— 11,707	K Acid (2 mols)	D
		I '20:— 400		
362	Toluylene Orange R Oxy Diamine Orange	I '14:— 25,908	4: 6-Diamino- <i>m</i> -toluene-sulfonic Acid (2 mols)	D
		M '19:— ? I '20:— 1,653		
363	Benzopurpurin 4B	I '14:—351,712	Naphthionic Acid (2 mols)	D
		M '17:— ?		
		M '18:—356,522		
		M '19:—288,021		
		I '20:— 3,492 M '20:—617,629		
364	Benzo Purpurin 6B	I '14:— 9,171	Laurent's Acid (2 mols)	D
		I '20:— 4,743		
365	Benzopurpurin B	I '14:— 21,090	Broenner's Acid (2 mols)	D
		M '17:— ?		
		M '18:— ?		
		M '19:— ?		
366	Diamine Red B Deltapurpurin 5B	I '14:— 21,058	2-Naphthylamine-7-sulfonic Acid Broenner's Acid	D
		M '17:— ?		
		M '18:— ?		
		I '20:— 1,896		



Dyes Derived from *o*-Tolidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
367	Diamine Red 3B Deltapurpurin 7B		2-Naphthylamine-7- sulfonic Acid (2 mols)	D
368	Brilliant Purpurin 4B	I '14:— 6,634	Naphthionic Acid Broenner's Acid	D
369	Brilliant Purpurin R	I '14:— 8,051	Amino-R Acid Naphthionic Acid	D
370	Brilliant Congo R	I '14:— 19,133 I '20:— 11,129	Amino-R Acid Broenner's Acid	D
371	Rosazurine G		Ethyl-2-naphthyl- amine-7-sulfonic Acid 2-Naphthylamine-7- sulfonic Acid	D
372	Rosazurine B		Ethyl-2-naphthylamine- 7-sulfonic Acid (2 mols)	D
373	Congo Orange R	I '14:— 7,027 I '20:— 254	Amino-R Acid Phenol [Ethylation]	D
374	Congo 4R Congo Red 4R	M '18:— ?	Naphthionic Acid Resorcinol	D
375	Congo Corinth B	I '14:— 2,196 M '19:— ?	Naphthionic Acid Nevile-Winther's Acid	D
376	Pyramidol Brown T		Resorcinol (2 mols)	D
377	Azo Blue	I '14:— 198 M '19:— ? M '20:— ?	Nevile-Winther's Acid (2 mols)	D
378	Trisulfon Blue R	I '14:— 911 M '19:— ? M '20:— ?	1-Naphthol-3: 6: 8- trisulfonic Acid $\beta$ -Naphthol	D

Dyes Derived from *o*-Tolidine (*continued*)

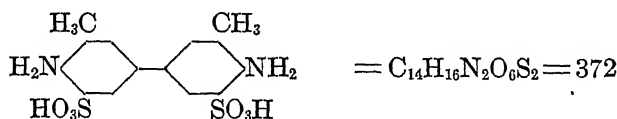
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
379	Dianil Blue 2R Benzo New Blue 2B	I '14:— 14,434	Chromotropic Acid Nevile-Winther's Acid	D
380	Dianil Blue B		Chromotropic Acid (2 mols)	D
381	Azo Black Blue B, R		H Acid <i>m</i> -Hydroxy-diphenyl- amine	D
382	Azo Mauve B	M '17:— ? M '20:— ?	H Acid $\alpha$ -Naphthylamine	D
383	Naphthazurine B	I '14:— 4,782	H Acid $\beta$ -Naphthylamine	D
384	Chicago Blue 2R Diamine Blue C2R	I '14:— 23,877	Croceine Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
385	Oxamine Blue 4R	I '14:— 573 M '20:— ?	J Acid Nevile-Winther's Acid	D
386	Diamine Blue BX Benzo Blue BX	I '14:— 1,740 M '17:— ? M '18:— ? M '19:— 92,214 I '20:— 4,520 M '20:— 90,147	Nevile-Winther's Acid H Acid	D
387	Columbia Blue G	I '14:— 7,094	1-Naphthol-3: 8- disulfonic Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
388	Chicago Blue R		1-Amino-8-naphthol-4- sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	DISAZO DYES ( <i>continued</i> )			
389	Eboli Blue B		1-Amino-8-naphthol- 3:5-disulfonic Acid (2 mols)	D
390	Benzo Cyanine B	I '14:— 201	H Acid 1-Amino-8-naphthol-4- sulfonic Acid	D
391	Diamine Blue 3B Benzo Blue 3B	I '14:— 1,365 M '17:— 14,533 M '18:— 99,645 M '19:— 182,946 I '20:— 1,120 M '20:— 136,891	H Acid (2 mols)	D
392	Toluylene Orange G	I '14:— 67,022 M '18:— ? M '19:— ? I '20:— 273 M '20:— ?	4:6-Diamino- <i>m</i> -tolu- ene-sulfonic Acid <i>o</i> -Cresotic Acid	D
393	Diphenyl Brown 3GN	M '20:— ?	Salicylic Acid Dimethyl- $\gamma$ Acid	D
394	Chrysamine R	I '14:— 6,261 M '20:— ?	Salicylic Acid (2 mols)	D
395	Cresotine Yellow R		<i>o</i> -Cresotic Acid (2 mols)	D
396	Indazurine RM		1:7-Dihydroxy-2-naph- thoic-4-sulfonic Acid Nevile-Winther's Acid	D
397	Direct Blue R	M '17:— ?	1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid Nevile-Winther's Acid	D
398	Direct Gray B		1:7-Dihydroxy-6-naph- thoic-3-sulfonic Acid (2 mols)	D

Dyes Derived from *o*-Tolidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
399	DISAZO DYES (continued) Indazurine GS		1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid Gamma Acid	D
450	TRISAZO DYES Benzo Black Blue R		$\alpha$ -Naphthylamine Nevile-Winther's Acid (2 mols)	D
451	Congo Fast Blue R	I '14:— 4,449 M '19:— ? I '20:— 723	$\alpha$ -Naphthylamine 1-Naphthol-3: 8-disulfonic Acid (2 mols)	D
452	Benzo Indigo Blue		$\alpha$ -Naphthylamine 1: 8-Dihydroxy-naphthalene-4-sulfonic Acid (2 mols)	D
453	Columbia Black R	I '14:— 1,307	2 R Acid <i>m</i> -Tolylene-diamine (2 mols)	D
454	Trisulfon Brown G	I '14:— 1,323	2 R Acid Salicylic Acid <i>m</i> -Phenylene-diamine	D
481	Azo Corinth		Naphthionic Acid Resorcinol 3-Amino-1-phenol-4-sulfonic Acid	D

*o*-Tolidine-disulfonic Acid2: 2'-Diamino-5: 5'-bi-*m*-toluene-sulfonic Acid (*C. A. nomen.*)

FORMATION.—From tolidine sulfate by heating with 2 parts of sulfuric acid at 210° from 36 to 48 hours

LITERATURE.—Cain, Intermediate Products (2d Ed.), 96  
Lange, Zwischenprodukte, #1269–1271

**Dye Derived from *o*-Tolidine-disulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
400	DISAZO DYE Milling Scarlet 4R Acid Anthracene Red 3B	I '14:— 18,330 I '20:— 2,336	$\beta$ -Naphthol (2 mols)	A

***p*-Toluene-sulfochloride**

See, *p*-Toluene-sulfonyl Chloride (*C. A. nomen.*)

***p*-Toluene-sulfonyl Chloride (*C. A. nomen.*)**

***p*-Toluene-sulfochloride**



STATISTICS.—Imports '14:—small amount  
Manufactured '17:— ?  
Manufactured '18:— ?  
Manufactured '19:—58,932 lbs.  
Manufactured '20:— ?

FORMATION.—Toluene is sulfonated with oleum giving a mixture of *o*- and *p*-toluene-sulfonic acids, which are converted to sodium salts and dried, and then treated with  $\text{PCl}_3 + \text{Cl}$ , resulting in *o*- and *p*-toluene-sulfonyl chlorides. The  $\text{POCl}_3$  formed is first distilled off and then the mass cooled, whereupon the *p*-toluene-sulfonyl chloride crystallizes out

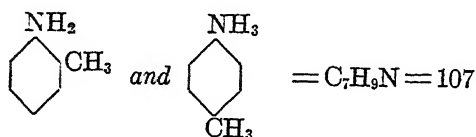
LITERATURE.—Thorpe, Dic. Chemistry, 4, 606  
Biel., II, 132

Dye Derived from *p*-Toluene-sulfonyl Chloride

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
1S2	MONOAZO DYE Fast Sulfon Violet Brilliant Sulfon Red B	I '14:— 4,871 I '20:— 4,740	H Acid Aniline	A

## Toluidines, mixed

## Mixed Toluidines



STATISTICS.—Imported '14:— 108,835 lbs.

Manufactured '17:—1,366,321 lbs.

Manufactured '18:— 308,667 lbs.

Manufactured '19:— 806,210 lbs.

Manufactured '20:—1,145,361 lbs.

FORMATION.—Toluene is nitrated using mixed acid, and the mixture of *o*- and *p*-nitro-toluenes is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 57

Lange, Zwischenprodukte, #234-240

## Dyes Derived from Toluidines, mixed

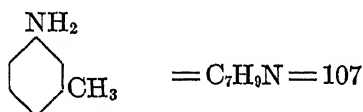
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
21	PYRAZOLONE DYE Pigment Chrome Yellow L		3-Methyl-1-phenyl-5-pyrazolone	CL

Dyes Derived from Toluidines, mixed (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
70	MONOAZO DYES Brilliant Orange O	I '14:— 21,480 M '17:— ? M '18:— ? M '19:— ? M '20:— ?	Schaeffer's Acid	A
71	Azo Fuchsine B		1: 8-Dihydroxy-naphthalene-4-sulfonic Acid	A
688	AZINE DYE Rosolane Mauve	I '14:— 796 I '20:— 3	Aniline Toluidines (3 mols)	B

*m*-Toluidine

Note.—C. A. numbering begins with  $NH_2$ , while German and English numbering generally start from  $CH_3$



STATISTICS.—Imported '14:—945 lbs.

Manufactured '20:— ?

FORMATION.—*m*-Nitro-benzaldehyde is chlorinated to *m*-nitro-benzylidene chloride ( $C_6H_4 \cdot NO_2 \cdot CHCl_2$ ), which by reduction with zinc at low temperatures, forms *m*-toluidine

LITERATURE.—Ber. 13, 677; 15, 2011; 18, 3398

Dyes Derived from *m*-Toluidine

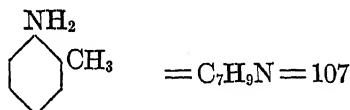
Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
240	DISAZO DYE Janus Red B	I '14:— 250 I '20:— 176	<i>m</i> -Amino-phenyl-trimethyl-ammonium Chloride $\beta$ -Naphthol	B

Dyes Derived from *m*-Toluidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
435	TRISAZO DYE Janus Brown B		<i>m</i> -Amino-phenyl-trimethyl-ammonium Chloride Aniline <i>m</i> -Phenylene-diamine	B

*o*-Toluidine

*Note*.—C. A. numbering begins with  $\text{NH}_2$ , while German and English numbering generally starts from  $\text{CH}_3$



STATISTICS.—Imported '14:— 656,320 lbs.  
 Manufactured '17:— 336,985 lbs.  
 Manufactured '18:— 638,874 lbs.  
 Manufactured '19:—1,002,982 lbs.  
 Manufactured '20:—1,302,097 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o*- and *p*-nitro-toluenes, which are separated. The *o*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 57  
 Lange, *Zwischenprodukte*, #234-240

Dyes Derived from *o*-Toluidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
68	MONOAZO DYES Spirit Yellow R	M '19:— ? M '20:— ?	<i>o</i> -Toluidine (2 mols)	ss
69	Chrysoidine R		<i>m</i> -Tolylene-diamine	B



Dyes Derived from *o*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
124	Diazine Green S	I '14:— 1,340	<i>p</i> -Tolylene-diamine Aniline or 2d mol <i>o</i> -Toluidine [Preceding used as Safranine] with Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	<i>p</i> -Tolylene-diamine Aniline or 2d mol <i>o</i> -Toluidine [Preceding used as Safranine] with Phenol	B
126	Indoine Blue R Union Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	<i>p</i> -Tolylene-diamine Aniline or 2d mol <i>o</i> -Toluidine [Preceding used as Safranine] with $\beta$ -Naphthol	B
127	Methyl Indoine B	M '17:— ?	<i>p</i> -Tolylene-diamine Aniline or 2d mol <i>o</i> -Toluidine [Preceding used as Safranine] with "Amino-naphthols"	B
128	Janus Gray B		<i>p</i> -Tolylene-diamine Aniline or 2d mol <i>o</i> -Toluidine [Preceding used as Safranine] [Other intermediate unknown]	B

Dyes Derived from *o*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
280	DISAZO DYES Azidine Fast Scarlet GGS		<i>o</i> -Toluidine (2 mols) Sulfo- <i>m</i> -tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic Acid)	D
281	Azidine Fast Scarlet 4BS		$\beta$ -Naphthylamine Sulfo- <i>m</i> -tolylene-diamine-bis(carbonyl-amino-naphthol-sulfonic acid)	D
482	TRISAZO DYE Alizarin Yellow FS		Aniline and <i>p</i> -Toluidine [as Fuchsin] Salicylic Acid (3 mols)	M
512	TRIPHENYL-METHANE DYES Magenta Fuchsin	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline <i>p</i> -Toluidine [Arsenic Acid or Nitro-benzene]	B
513	New Fuchsin O	I '14:— 300 M '18:— ? M '19:— ? M '20:— ?	Anhydro-formaldehyde- <i>o</i> -toluidine or Diamino- <i>o</i> -ditolyl-methane [ <i>o</i> -Nitro-toluene, etc.]	B
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline <i>p</i> -Toluidine [Nitro-benzene, etc., or Arsenic Acid] [Methylation or ethylation] or [Magenta methylated or ethylated]	B

# DYES CLASSIFIED BY INTERMEDIATES

## Dyes Derived from *o*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>
	TRIPHENYL-METHANE DYES (continued)		
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) <i>p</i> -Toluidine [Benzoic Acid] or [Magenta phenylated]
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline <i>p</i> -Toluidine [Sulfonation] or [Magenta sulfonated]
525	Red Violet 5RS		Aniline <i>p</i> -Toluidine, etc. [Ethylation Sulfona- tion] or [Red Violet 5R, sulfonated]
526	Acid Violet 4RS		Aniline <i>p</i> -Toluidine [Dimethylation, Trisulfonation] or [Magenta dimethylated, trisulfonated]
536	Alkali Blue	I '14:—286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	<i>p</i> -Toluidine Aniline (3–4 mols) [Sulfonation] or [Spirit Blue sulfonated]

Dyes Derived from *o*-Toluidine (continued)

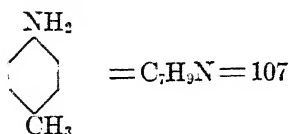
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES (continued)			
537	Methyl Blue for Silk Marine Blue	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	Aniline (4 mols) <i>p</i> -Toluidine [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	Aniline (4 mols) <i>p</i> -Toluidine [Di- and trisulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	<i>p</i> -Toluidine Aniline (3-4 mols) [Di- and tri-sulfonation] or [Spirit Blue di- and tri- sulfonated]	A
540	Pacific Blue		Aniline <i>p</i> -Toluidine Diamino-diphenyl- methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		$\beta$ -Naphthylamine (3 mols) Aniline <i>p</i> -Toluidine [Disulfonation]	B
582	XANTHONE DYE Fast Acid Violet A2R	I '14:— 875 I '20:— 2,679 M '20:— ?	Phthalic Anhydride Resorcinol (2 mols) <i>o</i> -Toluidine (2 mols) [PCl <sub>5</sub> , Sulfonation]	A
606	ACRIDINE DYE Phosphine	I '14:— 168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	<i>p</i> -Toluidine Aniline [Magenta by-product]	B

Dyes Derived from *o*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	AZINE DYES			
679	Safranine	I '14:— 59,921 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	<i>p</i> -Tolylene-diamine Aniline or <i>o</i> -Toluidine (extra mol)	B
683	Salfranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl- <i>p</i> -phenylene- diamine Aniline [Oxidation]	B
687	Rosolane O	I '20:— 1,083	<i>o</i> -Amino-diphenylamine Aniline [Oxidation]	B
702	Para Blue		Aniline (3–4 mols) <i>p</i> -Toluidine <i>p</i> -Phenylene-diamine or [Spirit Blue, <i>p</i> -Pheny- lene-diamine]	B
703	Rubramine		Nitroso-dimethyl- aniline <i>p</i> -Toluidine	B
704	Indamine 3R		Nitroso-dimethyl- aniline	B
705	Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl- aniline <i>p</i> -Toluidine	B
	SULFUR DYE			
733	Immedial Indone	I '14:— 4,236	<i>p</i> -Amino-phenol [S+N <sub>2</sub> S]	S
	INDIGO GROUP DYE			
888	Indigo MLB/T	I '14:— 10,730 I '20:— 827	<i>o</i> -Toluidine (2 mols) [Chloro-acetic, soda- mide, etc.]	V

*p*-Toluidine

Note.—C. A. numbering begins with  $\text{NH}_2$ , while German and English numbering generally starts from  $\text{CH}_3$



STATISTICS.—Imported '14:— 24,686 lbs.  
 Manufactured '17:—223,778 lbs.  
 Manufactured '18:—205,852 lbs.  
 Manufactured '19:—575,841 lbs.  
 Manufactured '20:—894,169 lbs.

FORMATION.—Toluene is nitrated to a mixture of *o*- and *p*-nitro-toluenes, which are separated. The *p*-nitro-toluene is reduced with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 58  
 Lange, Zwischenprodukte, #234-240, 261

Dyes Derived from *p*-Toluidine

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
482	TRISAZO DYES Alizarin Yellow FS		Aniline and <i>o</i> -Toluidine [or Magenta] Salicylic Acid (3 mols)	M
511	TRIPHENYL-METHANE DYES Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	Aniline (2 mols) [Nitro-benzene and iron or Arsenic Acid]	B
512	Magenta Fuchsine	I '14:— 87,102 M '17:— 17,739 M '18:— 71,675 M '19:—155,830 I '20:— 189 M '20:—284,285	Aniline <i>o</i> -Toluidine [Nitro-benzene, etc.; or Arsenic Acid]	B

Dyes Derived from *p*-Toluidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
514	Red Violet 5R	I '14:— 331 I '20:— 750	Aniline <i>o</i> -Toluidine [Nitro-benzene, etc.; or Arsenic Acid] [Methylation or ethyla- tion] or [Magenta methylated or ethylated]	B
520	Light Blue Superfine Spirit Soluble Diphenylamine Blue	I '14:— 2,149	Aniline (5 mols) [Benzoic Acid]	ss
521	Spirit Blue Aniline Blue	I '14:— 50,563 M '17:— ? M '18:— ? M '19:— ? I '20:— 723 M '20:— ?	Aniline (3–4 mols) <i>o</i> -Toluidine [Benzoic Acid] or [Magenta phenylated]	ss
524	Fuchsine S Acid Magenta	I '14:— 19,098 I '20:— 524 M '20:— ?	Aniline <i>o</i> -Toluidine [Sulfonation] or [Magenta sulfonated]	A
525	Red Violet 5RS		Aniline <i>o</i> -Toluidine [Ethylation, Sulfona- tion] or [Red Violet 5R sulfonated]	A
526	Acid Violet 4RS		Aniline <i>o</i> -Toluidine [Dimethylation, Tri- sulfonation] or [Magenta methylated, sulfonated]	A

Dyes Derived from *p*-Toluidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRIPHENYL-METHANE DYES ( <i>continued</i> )			
535	Methyl Alkali Blue	I '14:— 273 M '18:— ? M '19:— ? I '20:— 29	Aniline (5 mols) [Sulfonation]	A
536	Alkali Blue	I '14:— 286,751 M '17:— ? M '18:— 43,184 M '19:— 77,796 I '20:— 6,778 M '20:— 74,253	<i>o</i> -Toluidine Aniline (3–4 mols) [Sulfonation]	A
537	Methyl Blue for Silk Marine Blue	I '14:— 34,867 M '18:— ? M '19:— ? I '20:— 2,395 M '20:— ?	<i>o</i> -Toluidine Aniline (4 mols) [Sulfonation]	A
538	Methyl Blue Cotton Blue	I '14:— 50,255	<i>o</i> -Toluidine Aniline (4 mols) [Di- and tri-sulfonation]	B
539	Water Blue Soluble Blue	I '14:— 91,152 M '18:— ? M '19:— 16,315 I '20:— 1,387 M '20:— 98,770	<i>o</i> -Toluidine Aniline (3–5 mols) [Di- and tri-sulfonation] or [Spirit Blue Sulfonated]	A
540	Pacific Blue		Aniline <i>o</i> -Toluidine Diamino-diphenyl- methane [Sulfonation]	D
541	Brilliant Dianil Blue 6G		$\beta$ -Naphthylamine (3 mols) Aniline <i>o</i> -Toluidine [Disulfonation]	B



Dyes Derived from *p*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
580	XANTHONE DYE Fast Acid Violet B	I '14:— 20,688 M '19:— ? I '20:— 2,907	Phthalic anhydride Resorcinol (2 mols) <i>p</i> -Toluidine (2 mols) or Aniline (2 mols) [PCl <sub>5</sub> , Sulfonation]	A
606	ACRIDINE DYE Phosphine	I '14:—168,175 M '17:— ? M '18:— ? M '19:— 14,648 I '20:— 19,259 M '20:— ?	Aniline <i>o</i> -Toluidine or 2d mol Aniline [Magenta by-product]	B
616	THIOBENZENYL DYE Primuline	I '14:— 67,976 M '17:— 72,461 M '18:— 72,778 M '19:—271,338 I '20:— 441 M '20:—183,179	<i>p</i> -Toluidine (4 mols) [Sulfur, Sulfonation]	D
683	AZINE DYES Safranine MN	I '14:— 198 M '18:— ? M '19:— ? M '20:— ?	Dimethyl- <i>p</i> -phenylene- diamine Aniline [Oxidation]	B
686	Amethyst Violet		Diethyl- <i>p</i> -phenylene- diamine Diethyl-aniline [Oxidation]	D
702	Para Blue		Aniline (3–4 mols) <i>o</i> -Toluidine <i>p</i> -Phenylene-diamine or [Spirit Blue and <i>p</i> - Phenylene-diamine]	B
703	Rubramine		Nitroso-dimethyl- aniline <i>o</i> -Toluidine	B

Dyes Derived from *p*-Toluidine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
705	AZINE DYE (continued) Indamine 6R	I '14:— 66,170 I '20:— 9,681	Nitroso-dimethyl- aniline <i>o</i> -Toluidine	B
852	ANTHRAQUINONE AND ALLIED DYES Alizarin Irisol D, R	I '20:— 401	Quinizarin [Sulfonation]	A
853	Anthraquinone Violet	I '14:— 1,202 I '20:— 1,649	1: 5-Dinitro-anthraqui- none [Sulfonation]	ACr
854	Alizarin Viridine DG, FF	I '20:— 11,397	Anthraquinone-2-sul- fonic Acid [Sulfonation] [Or through Alizarin Bordeaux from Aliz- arin]	M
855	Alizarin Pure Blue B		1-Amino-2: 4-dibromo- anthraquinone [Sulfonation]	ACr
856	Alizarin Astrol B	I '14:— 10,907 I '20:— 15,518	1-Bromo-4-methyl- amino-anthraquinone [Sulfonation]	ACr
859	Cyananthrol R	I '14:— 18,792 I '20:— 2,416	1-Amino-4-bromo-2- methyl-anthraquinone [Sulfonation]	A
860	Cyananthrol G		1-Amino-4-bromo- (chloro)-2-methyl-an- thraquinone, etc. [Sulfonation]	A
864	Anthraquinone Green GX	I '14:— 1,709 I '20:— 2,531	1-Nitro-anthraquinone- 6-sulfonic Acid Aniline	ACr

Dyes Derived from *p*-Toluidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
865	ANTHRAQUINONE AND ALLIED DYES ( <i>continued</i> ) Alizarin Cyanine Green E		Quinizarin <i>p</i> -Toluidine (2 mols) [Sulfonation]	ACr

***o*-Toluidine-*m*-sulfonic Acid***See, 4-Amino-m-toluene-sulfonic Acid (C. A. nomen.)****p*-Toluidine-*o*-sulfonic Acid***See, 5-Amino-o-toluene-sulfonic Acid (C. A. nomen.)***8-*p*-Toluidino-1-naphthalene-sulfonic Acid (C. A. nomen.)***See, p-Tolyl-1-naphthylamine-8-sulfonic Acid****m*-Toluylene-diamine***See, m-Tolylene-diamine****o*: *p*-Toluylene-diamine***See, m-Tolylene-diamine***Toluylene-diamine-sulfonic Acid***See, 3: 5-Diamino-p-toluene-sulfonic Acid (C. A. nomen.)****m*-Toluylene-diamine-sulfonic Acid***See, 4: 6-Diamino-m-toluene-sulfonic Acid (C. A. nomen.)****p*-(*o*-Tolyl-azo)-*o*-toluidine (C. A. nomen.)***See, o-Amino-azo-toluene*

4-*m*-Tolylene-bis(thiourea) (*C. A. nomen.*)

See, *m*-Tolylene-dithiourea

4-*m*-Tolylene-diamine (*C. A. nomen.*)

See, *m*-Tolylene-diamine

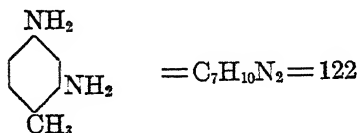
*m*-Tolylene-diamine

4-*m*-Tolylene-diamine (*C. A. nomen. NH<sub>2</sub> = 1*)

*m*-Toluylene-diamine

*o*:*p*-Toluylene-diamine

*Note.*—English and Germans often start numbering from *CH<sub>3</sub>*



STATISTICS.—Imported '14:—135,383 lbs.  
 Manufactured '17:—302,596 lbs.  
 Manufactured '18:—612,163 lbs.  
 Manufactured '19:—439,544 lbs.  
 Manufactured '20:—689,036 lbs.

FORMATION.—From *m*-dinitro-toluene by reduction with iron and hydrochloric acid

LITERATURE.—Cain, Intermediate Products (2d Ed.), 86

#### Dyes Derived from *m*-Tolylene-diamine

<i>Schulz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
34	MONOAZO DYES Chrysoidine R	I '14:—111,006 M '17:— 58,115 M '18:—137,035 M '19:—220,542 I '20:— 1,102 M '20:—186,793	Aniline	B

Dyes Derived from *m*-Tolylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES (continued)			
69	Chrysoidine R		<i>o</i> -Toluidine	B
	DISAZO DYES			
284	Vesuvine B Bismarck Brown R	I '14:—171,133 M '17:—262,600 M '18:—295,080 M '19:—631,308 M '20:—484,929	<i>m</i> -Tolylene-diamine (3 mols)	B
295	Diphenyl Fast Black	I '14:— 882	Gamma Acid <i>p</i> : <i>p'</i> -diamino-ditolyl- amine	D
352	Direct Violet R	I '14:— 661 M '19:— ?	Benzidine 1: 7-Dihydroxy-6-naph- thoic-3-sulfonic Acid	D
413	Direct Violet BB	I '14:— 4,396	Dianisidine 1: 7-Dihydroxy-naph- thalene-4-sulfonic Acid	D
	TRISAZO DYES			
453	Columbia Black R	I '14:— 1,307	Tolidine 2R Acid <i>m</i> -Tolylene-diamine (2 mols)	D
455	Columbia Black B	I '14:—165,727	Dianisidine 2R Acid <i>m</i> -Tolylene-diamine (2 mols)	D
458	Carbon Black		<i>p</i> -Phenylene-diamine- sulfonic Acid [from <i>p</i> -Nitro-aniline- <i>o</i> -sulfonic Acid] 1-Naphthylamine-6(7)- sulfonic Acid <i>m</i> -Tolylene-diamine (2 mols)	D

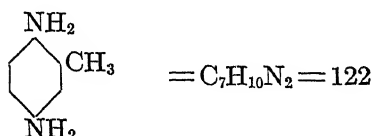
Dyes Derived from *m*-Tolylene-diamine (continued)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	TRISAZO DYES (continued)			
461	Coomassie Union Black		1: 4-Naphthylene-dia- mine-2-sulfonic Acid Gamma Acid <i>m</i> -Tolylene-diamine (2 mols)	D
463	Erie Direct Black RX Cotton Black E	I '14:—248,567 M '19:— ? M '20:— 2,050,741	Benzidine Aniline H Acid	D
	ACRIDINE DYES			
602	Acridine Yellow	I '14:— 1,913 M '19:— ?	<i>m</i> -Tolylene-diamine (2 mols) [Formaldehyde, Am- monia removal, Oxidation]	B
605	Benzoflavine	I '14:— 600	<i>m</i> -Tolylene-diamine (2 mols) Benzaldehyde [Ammonia removal, Oxidation]	B
	AZINE DYE			
670	Neutral Red	M '18:— ?	Nitroso-dimethyl- aniline or Dimethyl- <i>p</i> -phenylene- diamine [Oxidation]	B
	SULFUR DYE			
710	Immedial Yellow D	I '14:— 13,400	[Sulfur]	S
711	Immedial Orange N	I '14:— 500	[Sulfur]	S

*p*-Tolylene-diamine (C. A. *nomen.*  $\text{NH}_2=1$ )

*p*-Toluylene-diamine

*Note.*—English and Germans often start numbering with  $\text{CH}_3$



STATISTICS.—Manufactured '20:— ?

FORMATION.—By reduction of amino-azo-toluene (from *o*-toluidine) with zinc dust and hydrochloric acid

LITERATURE.—Nietzki, Ber. 10, 1158

Green, Organic Coloring Matters (1908), 37

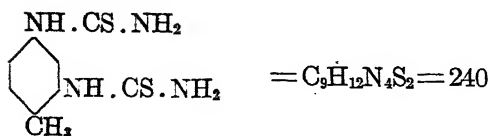
**Dyes Derived from *p*-Tolylene-diamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
124	MONOAZO DYES Diazine Green S	I '14:— 1,340	<i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine [or Safranin] Dimethyl-aniline	B
125	Diazine Black	I '14:— 2,630 I '20:— 701	<i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine [or Safranin] Phenol	B
126	Indoine Blue R	I '14:— 15,353 M '17:— ? M '18:— ?	<i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine [or Safranin] $\beta$ -Naphthol	B

Dyes Derived from *p*-Tolylene-diamine (continued)

Schultz Number for Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Appli- cation Class
127	MONOAZO DYES (continued) Methyl Indone B	M '17:— ?	<i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine [or Safranin] ["Amino-naphthols"]	B
128	Janus Gray B		<i>o</i> -Toluidine Aniline or <i>o</i> -Toluidine [or Safranin] etc.	B
679	AZINE DYE Safranin	I '14:— 59,920 M '17:— ? M '18:—106,591 M '19:—131,042 I '20:— 386 M '20:—149,629	<i>o</i> -Toluidine Aniline or 2d mol <i>o</i> -Toluidine	B

## 1-Tolylene-2:6-diamine-4-sulfonic Acid

See, 3: 5-Diamino-*p*-toluene-sulfonic Acid (*C. A. nomen.*)*m*-Tolylene-diamine-sulfonic AcidSee, 4: 6-Diamino-*m*-toluene-sulfonic Acid (*C. A. nomen.*)*m*-Tolylene-dithiourea4-*m*-Tolylene-bis[thiourea] (*C. A. nomen.*)



FORMATION.—By heating *m*-tolylene-diamine thiocyanate several hours on a water bath

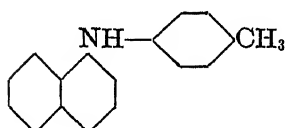
LITERATURE.—Lange, Zwischenprodukte, #801

**Dyes Derived from *m*-Tolylene-dithiourea**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
712	SULFUR DYES Kryogene Yellow G	I '14:— 1,126 I '20:— 1,543	Benzidine [Sulfur]	S
716	Kryogene Yellow R	I '14:— 4,804	[Sulfur]	S

***p*-Tolyl- $\alpha$ -naphthylamine**

*N-p*-Tolyl-1-naphthylamine (*C. A. nomen.*)



$$= \text{C}_{17}\text{H}_{15}\text{N} = 233$$

FORMATION.—From  $\alpha$ -naphthylamine hydrochloride and *p*-toluidine by heating together to about 280°

LITERATURE.—Cain, Intermediate Products (2d Ed.), 186

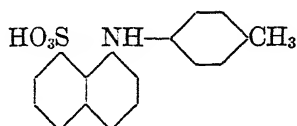
**Dye Derived from *p*-Tolyl- $\alpha$ -naphthylamine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
560	DIPHENYL-NAPHTHYL-METHANE DYE Night Blue	I '14:— 361 M '19:— ? I '20:— 11	Tetraethyl-diamino-benzophenone	B

## DYES CLASSIFIED BY INTERMEDIATES

*p*-Tolyl-1-naphthylamine-8-sulfonic Acid8-*p*-Toluidino-1-naphthalene-sulfonic Acid (*C. A. nomen.*)

Tolyl-peri Acid



$$= \text{C}_{17}\text{H}_{15}\text{NO}_3\text{S} = 313$$

STATISTICS.—Imports '14:—1,097 lbs.

Manufactured '18:— ?

Manufactured '19:— ?

Manufactured '20:— ?

FORMATION.—From 1-naphthylamine-8-sulfonic acid and *p*-toluidine by heating together in an autoclave

TEMPERATURE.—Cain, Intermediate Products (2d Ed.), 195

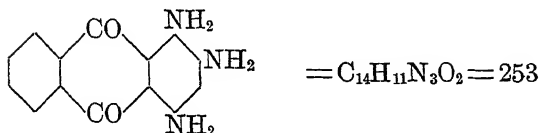
Lange, Zwischenprodukte, #2859

Dyes Derived from *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

Number of Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
89	MONOAZO DYE Sulfon Acid Blue B	I '14:— 35,560 M '17:— ? M '19:— ? M '20:— ?	H Acid	A
57	DISAZO DYE Sulfoncyanine	I '14:—145,694 M '17:— ? M '18:— ? M '19:— ? I '20:— 18,327 M '20:— ?	Metanilic Acid $\alpha$ -Naphthylamine	A

## Tolyl-peri Acid

See, *p*-Tolyl-1-naphthylamine-8-sulfonic Acid

**1:2:4-Triamino-anthraquinone**


FORMATION.—1:4-Diamino-anthraquinone is diacetylated, and then nitrated with nitric acid of sp. gr. 1.5. By reduction of the nitrated product the 1:2:4-triamino-anthraquinone is prepared

LITERATURE.—Lange, Zwischenprodukte, #3333

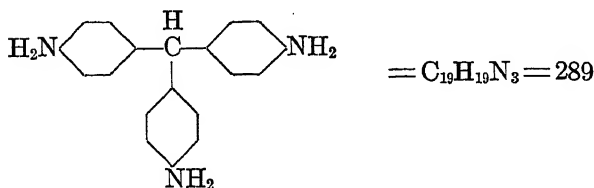
**Dye Derived from 1:2:4-Triamino-anthraquinone**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
822	ANTHRAQUINONE AND ALLIED DYES Algol Brilliant Orange FR	I '14:— 6,195 I '20:— 482	Benzoyl Chloride	V

**Triamino-triphenyl-methane**

Tris(*p*-amino-phenyl)-methane (*C. A. nomen.*)

*p*-Leucaniline



FORMATION.—(1) From para-rosaniline by reduction with zinc. (2) From corresponding nitro-compounds by reduction

LITERATURE.—Beilstein, Organische Chemie (3d Ed.), 4, 1194

# DYES CLASSIFIED BY INTERMEDIATES

## Dye Derived from Triamino-triphenyl-methane

Number of Dye	Ordinary Name and Class of Dye	Statistics of Import and Manufacture	Other Intermediates Used and Notes	Dye Application Class
511	TRIPHENYL-METHANE DYE Parafuchsine Paramagenta	I '14:— 65,026 M '18:— ? M '19:— ? M '20:— ?	(Oxidation)	B

### $\alpha$ -Trichloro-toluene

See, Benzo-trichloride

### 3:4:5-Trihydroxy-benzoic Acid

See, Gallic Acid

### Trimethyl-*m*-amino-phenyl-ammonium Chloride

See, (*m*-Amino-phenyl)-trimethyl-ammonium Chloride

### $\alpha$ -Trinitro-naphthalene

1:3:5-Trinitro-naphthalene (*not considered herein*)

### $\beta$ -Trinitro-naphthalene

1:3:8-Trinitro-naphthalene (*not considered herein*)

### $\gamma$ -Trinitro-naphthalene

1:4:5-Trinitro-naphthalene (*not considered herein*)

### $\delta$ -Trinitro-naphthalene

1:2:5-Trinitro-naphthalene (*not considered herein*)

### 1:3:5-Triphenyl-hexahydro-s-triazine (C. A. nomen.)

See, Anhydro-formaldehyde-aniline

**Tris(*p*-amino-phenyl)-methane** (*C. A. nomen.*)

*See*, Triamino-triphenyl-methane

**Trisulfonic Acid**

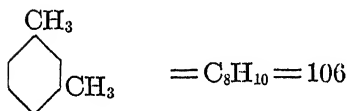
*See*, Naphthalene-1:3:6-trisulfonic Acid

**5:5'-Ureido-bis(2-amino-benzene-sulfonic Acid)** (*C. A. nomen.*)

*See*, Diamino-diphenyl-urea-disulfonic Acid

***m*-Xylene** (*C. A. nomen.*)

*m*-Xylol



**FORMATION.**—This occurs in commercial crude xylol as the most abundant constituent, and is separated from its isomers by treating the crude xylol with a limited quantity of sulfuric acid, and by hydrolysis of the sulfonate formed

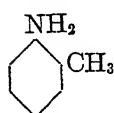
**LITERATURE.**—Green, *Organic Coloring Matters* (1908 Ed.), 5

**Dye Derived from *m*-Xylene**

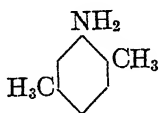
<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
564	TRIPHENYL-METHANE DYE(?) Naphthalene Green V	I '14:— 22,144 I '20:— 9,291	<i>p</i> -Dimethylamino- benzaldehyde Dimethyl-aniline	A

**Xylidine**

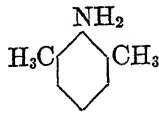
The crude mixture contains the following isomers:—



2:4-xylidine  
(*m*-4-xylidine)

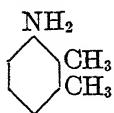


2:5-xylidine  
(*p*-xylidine)

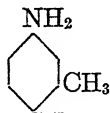


2:6-xylidine  
(*m*-2-xylidine)

(*C. A. nomen.*  $NH_2 = 1$ )  
( $CH_3 = 1$ )

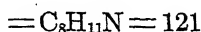


2:3-xylidine  
(*o*-3-xylidine)



3:4-xylidine  
(*o*-3-xylidine)

(*C. A. nomen.*  $NH_2 = 1$ )  
( $CH_3 = 1$ )



STATISTICS.—Imported '14:— 21,836 lbs.  
 Manufactured '17:—425,873 lbs.  
 Manufactured '18:—534,834 lbs.  
 Manufactured '19:—386,635 lbs.  
 Manufactured '20:—1,054,476 lbs.

FORMATION.—Xylene is nitrated with mixed acid, preferably cold.  
 The mixed nitro-xylenes are then reduced with iron and hydrochloric acid

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 58  
 Lange, *Zwischenprodukte*, #742-747

**Dyes Derived from Xylidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
76	MONOAZO DYES Sudan II	I '14:— 501 M '17:— 27,595 M '18:— 23,692 M '19:— ? M '20:—170,658	$\beta$ -Naphthol	SS
77	Azo Coccine 2R		Nevile-Winther's Acid	A
78	Cochineal Scarlet 4R		1-Naphthol-5-sulfonic Acid	A

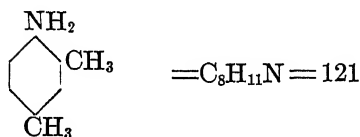
Dyes Derived from Xylidine (*continued*)

<i>Schultz Number for Dye</i>	<i>Ordinary Name and 'Class' of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Appli- cation Class</i>
	MONOAZO DYES ( <i>continued</i> )			
79	Brilliant Orange R Xylidine Orange 2R	I '14:— 4,204 M '17:— ? M '18:— 18,909 M '19:— ? M '20:— ?	Schaeffer's Acid	A
80	Wool Scarlet R	I '14:— 39,888	1-Naphthol-4: 8-disul- fonic Acid	A
82	Ponceau R	I '14:— 35,259 M '17:— 633,429 M '18:— 1,189,054 M '19:— 552,680 M '20:— 1,286,002	R Acid	A
685	AZINE DYE Tannin Heliotrope	I '14:— 1,398 I '20:— 249	Nitroso-dimethyl- aniline	B

2: 4-Xylidine (*C. A. nomen. N H<sub>2</sub> = 1*)

*m* 4-Xylidine (*CH<sub>3</sub> = 1*)

*m*-Xylidine



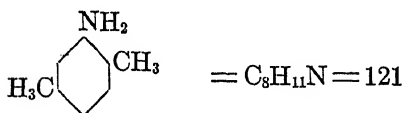
STATISTICS.—Manufactured '20:—but amount not disclosed

FORMATION.—By separation from commercial xylidine as acetate

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 59

## Dyes Derived from 2:4-Xylidine

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
81	MONOAZO DYES Palatine Scarlet A Brilliant Cochineal	I '14:— 7,510	1-Naphthol-3:6-disulfonic Acid	A
82	Ponceau 2R Scarlet 2R	I '14:— 35,259 M '17:—633,429 M '18:— 1,189,054 M '19:—552,680 M '20:— 1,286,002	R Acid [Only small part of total production from <i>m</i> -xylidine]	A
211	DISAZO DYE Resorcine Brown	I '14:— 13,189 M '17:— ? M '18:— ? M '19:— ? I '20:— 2,484 M '20:— ?	Sulfanilic Acid Resorcinol	A

2:5-Xylidine (*C. A. nomen. NH<sub>2</sub>=1*)*p*-Xylidine (*CH<sub>3</sub>=1*)

FORMATION.—Crude xylidine is treated with sufficient glacial acetic acid to cause the *m*-xylidine acetate to crystallize out. The mother liquor is mixed with hydrochloric acid, and after a few days the *p*-xylidine hydrochloride is separated

LITERATURE.—Cain, *Intermediate Products* (2d Ed.), 59  
Lange, *Zwischenprodukte*, #742-747



**Dye Derived from 2:5-Xylidine**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
438	TRISAZO DYE Melogene Blue BH	M '17:— ? M '18:— ?	Benzidine H Acid (2 mols)	D

**m-Xylidine**

*See, 2:4-Xylidine (C. A. nomen.)*

**m-4-Xylidine**

*See, 2:4-Xylidine (C. A. nomen.)*

**p-Xylidine**

*See, 2:5-Xylidine (C. A. nomen.)*

**Xylidine-sulfonic Acid**



FORMATION.—Probably by sulfonation of either crude or purified xylidine with sulfuric acid in a vacuum or in a current of an indifferent gas

LITERATURE.—Thorpe, *Dic. Chemistry*, 5, 797, 798

Junghahn, *Ber.* 35, 3747–3767 (1902)

**Dye Derived from Xylidine-sulfonic Acid**

<i>Schultz Number for Dye</i>	<i>Ordinary Name and Class of Dye</i>	<i>Statistics of Import and Manufacture</i>	<i>Other Intermediates Used and Notes</i>	<i>Dye Application Class</i>
214	DISAZO DYE Fast Brown O	I '14:— 2,000	Xylidine-sulfonic Acid (2 mols) $\alpha$ -Naphthol	A

4-(2:4-Xylyl-azo)-2:5-xylidine (*C. A. nomen.*)

*See*, Amino-azo-xylene

**Y Acid**

*See*, G Acid

**Yellow Acid**

1:3-Dihydroxy-naphthalene-5:7-disulfonic Acid (*not considered herein*)

**Zeta Acid**

Naphthasultone-3-sulfonic Acid (*not considered herein*)

# FORMULA INDEX OF INTERMEDIATES

The formulas are indexed here for the 487 intermediates for which data and tables are listed. Only one chemical name is given, but on the pages referred to there are enumerated the various trivial names and synonyms.

The arrangement of the formulas follows that of the 1920 Chemical Abstracts (C. A. 14, 4557) where "The arrangement of symbols in formulas is alphabetical except that in carbon compounds C always comes first, followed immediately by H." "The arrangement of the formulas is also alphabetical except that the number of atoms of any specific kind influences the order of compounds," *e.g.*, all compounds with C<sub>6</sub> come before those with C<sub>7</sub>, thus C<sub>6</sub>H<sub>5</sub>Cl precedes C<sub>7</sub>H<sub>6</sub>ClNO<sub>2</sub>. This is likewise true for *all* the other atoms, and consequently we find C<sub>7</sub>H<sub>6</sub>ClNO<sub>2</sub> before C<sub>7</sub>H<sub>9</sub>N, and C<sub>3</sub>H<sub>2</sub>Br<sub>2</sub>ClNO before C<sub>8</sub>H<sub>2</sub>Cl<sub>4</sub>O<sub>4</sub>.

It is believed that a formula index affords the easiest and surest way to find an organic compound, and it is for this reason that this index is given. This is particularly true of intermediates where often many names are used for the same chemical individual.

	PAGE		PAGE
CCl <sub>2</sub> O	Phosgene 486	C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>5</sub> S	2-Amino-6-nitro-phenol-4-sulfonic Acid 77
C <sub>6</sub> H <sub>6</sub> O <sub>8</sub>	Dihydroxy-tartaric Acid 229	C <sub>6</sub> H <sub>6</sub> O	Phenol 459
C <sub>6</sub> H <sub>5</sub> ClN <sub>2</sub> O <sub>4</sub>	1-Chloro-2: 4-dinitro-benzene 161	C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	Resorcinol 509
C <sub>6</sub> H <sub>5</sub> ClN <sub>2</sub> O <sub>7</sub> S	4-Chloro-3: 5-dinitro-benzene-sulfonic Acid 162	C <sub>6</sub> H <sub>6</sub> O <sub>3</sub>	Pyrogallol 499
C <sub>6</sub> H <sub>5</sub> Cl <sub>2</sub> NO <sub>2</sub>	2: 5-Dichloro-nitro-benzene 210	C <sub>6</sub> H <sub>6</sub> O <sub>4</sub> S	Pyrogallol-5-sulfonic Acid 500
C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>7</sub>	Picric Acid 495	C <sub>6</sub> H <sub>7</sub> N	Aniline 90
C <sub>6</sub> H <sub>5</sub> ClNO <sub>2</sub>	<i>o</i> -and <i>p</i> -Chloro-nitro-benzenes 169	C <sub>6</sub> H <sub>7</sub> NO	<i>m</i> -Amino-phenol 77
C <sub>6</sub> H <sub>5</sub> ClNO <sub>5</sub> S	2-Chloro-5-nitro-benzene-sulfonic Acid 109	C <sub>6</sub> H <sub>7</sub> NO <sub>3</sub> S	<i>p</i> -Amino-phenol 78
	4-Chloro-3-nitro-benzene-sulfonic Acid 170		Metanilic Acid 333
C <sub>6</sub> H <sub>4</sub> N <sub>2</sub> O <sub>4</sub>	<i>m</i> -Dinitro-benzene 251	C <sub>6</sub> H <sub>7</sub> NO <sub>4</sub> S	Sulfanilic Acid 528
C <sub>6</sub> H <sub>4</sub> N <sub>2</sub> O <sub>5</sub>	2: 4-Dinitro-phenol 258		2-Amino-phenol-4-sulfonic Acid 80
C <sub>6</sub> H <sub>5</sub> Cl	Chloro-benzene 161		3-Amino-phenol-4-sulfonic Acid 81
C <sub>6</sub> H <sub>5</sub> ClN <sub>2</sub> O <sub>2</sub>	2-Chloro-4-nitro-aniline 167	C <sub>6</sub> H <sub>7</sub> NO <sub>6</sub> S <sub>2</sub>	2-Amino- <i>p</i> -benzene-disulfonic Acid 39
C <sub>6</sub> H <sub>5</sub> ClO <sub>2</sub> S	Benzene-sulfonyl Chloride 125		4-Amino- <i>m</i> -benzene-disulfonic Acid 39
C <sub>6</sub> H <sub>5</sub> Cl <sub>2</sub> N	2: 5-Dichloro-aniline 206	C <sub>6</sub> H <sub>7</sub> NO <sub>7</sub> S <sub>2</sub>	4-Amino-phenol-2: 6-disulfonic Acid 79
C <sub>6</sub> H <sub>5</sub> Cl <sub>2</sub> NO	2-Amino-4: 6-dichloro-phenol 50	C <sub>6</sub> H <sub>7</sub> N <sub>2</sub> O <sub>2</sub>	4-Nitro- <i>m</i> -phenylene-diamine 437
C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>	Nitro-benzene 430	C <sub>6</sub> H <sub>8</sub> N <sub>2</sub>	<i>m</i> -Phenylene-diamine 465
	<i>p</i> -Nitroso-phenol 448		<i>p</i> -Phenylene-diamine 470
C <sub>6</sub> H <sub>5</sub> NO <sub>3</sub>	Nitro-phenol, <i>crude</i> 434	C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>3</sub> S	<i>p</i> -Phenylene-diamine-sulfonic Acid 474
	<i>o</i> -Nitro-phenol 435		Phenyl-hydrazine- <i>p</i> -sulfonic Acid 481
	<i>p</i> -Nitro-phenol 436	C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>4</sub> S	2: 6-Diamino-1-phenol-4-sulfonic Acid 198
C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>4</sub>	4-Nitroso-resorcinol 449	C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>6</sub> S <sub>2</sub>	<i>m</i> -Phenylene-diamine-disulfonic Acid 473
C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>5</sub>	2: 4-Dinitro-aniline 248		Aceto-acetic Ethyl Ester 21
C <sub>6</sub> H <sub>5</sub> ClNO <sub>5</sub> S	Picramic Acid 494	C <sub>7</sub> H <sub>4</sub> ClO <sub>3</sub>	2-Chloro-5-nitro-benzaldehyde 168
	2-Amino-6-chloro-benzene-sulfonic Acid 45		2-Chloro-6-nitro-benzaldehyde 168
C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>2</sub>	<i>m</i> -Nitro-aniline 420		2: 5-Dichloro-benzaldehyde 209
	<i>p</i> -Nitro-aniline 421		
C <sub>6</sub> H <sub>5</sub> N <sub>2</sub> O <sub>5</sub> S	2-Amino-5-nitro-benzene-sulfonic Acid 74		
	4-Amino-3-nitro-benzene-sulfonic Acid 75		
	6-Nitro-metanilic Acid 434		

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C <sub>7</sub> H <sub>5</sub> ClO	140	C <sub>8</sub> H <sub>7</sub> NO <sub>3</sub>	2-Nitro- <i>m</i> -tolualdehyde	449
C <sub>7</sub> H <sub>5</sub> ClO <sub>4</sub> S	158	C <sub>8</sub> H <sub>7</sub> NO <sub>4</sub> S	<i>o</i> -Nitro-phenyl-thioglycolic Acid	438
C <sub>7</sub> H <sub>5</sub> Cl <sub>3</sub>	138	C <sub>8</sub> H <sub>5</sub> N <sub>2</sub> O <sub>3</sub>	<i>p</i> -Nitro-acetanilide	417
C <sub>7</sub> H <sub>5</sub> NO <sub>3</sub>	427	C <sub>8</sub> H <sub>5</sub> O <sub>3</sub>	<i>o</i> -Cresotic Acid	177
	428	C <sub>8</sub> H <sub>5</sub> O <sub>4</sub>	Gallie Acid Methyl Ester	293
C <sub>7</sub> H <sub>5</sub> ClNO <sub>2</sub>	429	C <sub>8</sub> H <sub>5</sub> O <sub>7</sub> S <sub>2</sub>	3-Methyl-benzaldehyde-4: 6-disulfonic Acid	337
C <sub>7</sub> H <sub>5</sub> N <sub>2</sub> O <sub>4</sub>	432	C <sub>8</sub> H <sub>5</sub> N	Anhydro-formaldehyde- <i>o</i> -toluidine	90
C <sub>7</sub> H <sub>5</sub> N <sub>2</sub> O <sub>5</sub>	261	C <sub>8</sub> H <sub>5</sub> NO	Acetanilide	21
C <sub>7</sub> H <sub>5</sub> O	252	C <sub>8</sub> H <sub>5</sub> NO <sub>2</sub>	Phenyl-glycine	475
C <sub>7</sub> H <sub>5</sub> O <sub>2</sub>	120	C <sub>8</sub> H <sub>10</sub>	<i>m</i> -Xylene	575
	137	C <sub>8</sub> H <sub>10</sub> N <sub>2</sub> O	<i>p</i> -Amino-acetanilide	26
C <sub>7</sub> H <sub>5</sub> O <sub>2</sub> S	308		<i>p</i> -Nitroso-dimethyl-aniline	439
C <sub>7</sub> H <sub>5</sub> O <sub>3</sub>	544		<i>p</i> -Nitroso-ethyl-aniline	445
C <sub>7</sub> H <sub>5</sub> O <sub>4</sub>	518	C <sub>8</sub> H <sub>11</sub> N	Dimethyl-aniline	237
	516		<i>N</i> -Ethyl-aniline	271
C <sub>7</sub> H <sub>5</sub> O <sub>4</sub> S	122		<i>N</i> -Methyl- <i>o</i> -toluidine	345
C <sub>7</sub> H <sub>5</sub> O <sub>5</sub>	289		Xylidine	576
C <sub>7</sub> H <sub>5</sub> O <sub>5</sub> S <sub>2</sub>	121		2: 4-Xylidine (NH <sub>2</sub> = 1)	577
C <sub>7</sub> H <sub>7</sub> Cl	143		2: 5-Xylidine (NH <sub>2</sub> = 1)	578
C <sub>7</sub> H <sub>7</sub> ClO <sub>2</sub> S	551	C <sub>8</sub> H <sub>11</sub> NO	2-Amino- <i>p</i> -cresol Methyl Ether	49
C <sub>7</sub> H <sub>7</sub> NO	37		<i>m</i> Dimethylamino-phenol	236
	38		<i>m</i> -Ethylamino-phenol	271
C <sub>7</sub> H <sub>7</sub> NO <sub>2</sub>	40		<i>p</i> -Phenetidine	458
	110	C <sub>8</sub> H <sub>11</sub> NO <sub>3</sub> S	Xylidine-sulfonic Acid	579
C <sub>7</sub> H <sub>7</sub> NO <sub>3</sub>	450	C <sub>8</sub> H <sub>12</sub> N <sub>2</sub>	<i>N</i> : <i>N</i> -Dimethyl- <i>m</i> -phenylene-diamine	244
C <sub>7</sub> H <sub>7</sub> NO <sub>4</sub>	451		<i>N</i> : <i>N</i> -Dimethyl- <i>p</i> -phenylene-diamine	244
C <sub>7</sub> H <sub>7</sub> NO <sub>4</sub> S	84		Ethyl-phenyl-hydrazine	277
	426		<i>N</i> : <i>N</i> -Dimethyl- <i>p</i> -phenylene-diamine-thiosulfonic Acid	246
	287		2-Hydroxy-thionaphthalene-1-carboxylic Acid	315
	452		5-Bromo-2-hydroxy-3-methyl-thionaphthalene	150
C <sub>7</sub> H <sub>7</sub> ClNO	532	C <sub>8</sub> H <sub>12</sub> N <sub>2</sub> O <sub>3</sub> S <sub>2</sub>	5-Chloro-phenyl-thioglycol- <i>o</i> -carboxylic Acid	171
C <sub>7</sub> H <sub>7</sub> ClNO <sub>3</sub> S	156		Isoquinoline	323
	46		Quinoline	503
C <sub>7</sub> H <sub>7</sub> N <sub>2</sub> O	446		4-Chloro-2-Tolyl-thioglycolic Acid	172
C <sub>7</sub> H <sub>7</sub> N <sub>2</sub> O <sub>2</sub>	454	C <sub>8</sub> H <sub>7</sub> BrOS	7-Methyl-indoxyl	341
	455		Phenyl-glycine- <i>o</i> -carboxylic Acid	478
C <sub>7</sub> H <sub>7</sub> N <sub>2</sub> O <sub>3</sub>	455	C <sub>8</sub> H <sub>7</sub> ClO <sub>4</sub> S	<i>p</i> -Dimethylamino-benzoyl Chloride	232
	75		<i>p</i> -Dimethylamino-benzaldehyde	231
	425		<i>p</i> -Nitroso-ethyl- <i>o</i> -toluidine	446
C <sub>7</sub> H <sub>7</sub> O	426		5-Dimethylamino-2-nitroso- <i>p</i> -cresol	236
C <sub>7</sub> H <sub>7</sub> O <sub>2</sub>	177		<i>m</i> -Tolylene-dithiourea	570
C <sub>7</sub> H <sub>7</sub> N	515	C <sub>8</sub> H <sub>12</sub> N <sub>4</sub> S <sub>2</sub>	<i>N</i> -Ethyl- <i>N</i> -methyl-aniline	274
	336		<i>N</i> -Ethyl- <i>o</i> -toluidine	281
	552		<i>N</i> -Ethyl- <i>p</i> -toluidine	282
C <sub>7</sub> H <sub>7</sub> NO	553		Mesidine	332
	554		Pseudocumidine	497
	560		<i>o</i> -Amino-benzyl-dimethylamine	42
C <sub>7</sub> H <sub>7</sub> NO <sub>2</sub>	47		<i>N</i> <sup>8</sup> -Ethyl-4- <i>m</i> -tolylene-diamine	283
	48		<i>N</i> <sup>8</sup> -Ethyl- <i>p</i> -tolylene-diamine ( <i>m</i> -Amino-phenyl)-trimethylammonium Chloride	82
C <sub>7</sub> H <sub>7</sub> NO <sub>3</sub> S	107		1: 5-Dinitro-naphthalene	256
	86		1: 5- <i>and</i> 1: 8-Dinitro-naphthalenes	256
C <sub>7</sub> H <sub>10</sub> N <sub>2</sub>	87		1: 8-Dinitro-naphthalene	257
C <sub>7</sub> H <sub>10</sub> N <sub>2</sub> O <sub>3</sub> S	566		1: 2-Naphthoquinone	381
	569		Naphthazarin	352
	200		1: 2-Naphthoquinone-4-sulfonic Acid	382
C <sub>8</sub> H <sub>2</sub> Br <sub>2</sub> ClNO	200		1: 2-Naphthoquinone-4: 6-disulfonic Acid	381
C <sub>8</sub> H <sub>2</sub> Cl <sub>4</sub> O <sub>4</sub>	206			
C <sub>8</sub> H <sub>4</sub> Cl <sub>2</sub> O <sub>4</sub>	536			
C <sub>8</sub> H <sub>4</sub> O <sub>3</sub>	211			
C <sub>8</sub> H <sub>5</sub> NO <sub>2</sub>	487			
	321			
C <sub>8</sub> H <sub>5</sub> ClNO <sub>4</sub> S	493			
	170			
C <sub>8</sub> H <sub>5</sub> OS	313			
C <sub>8</sub> H <sub>7</sub> ClO <sub>2</sub> S	171			
	320			
C <sub>8</sub> H <sub>7</sub> NO				
C <sub>8</sub> H <sub>7</sub> NOS				

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$C_{10}H_7ClO_4S$	1-Chloro-8-naphthol-4-sulfonic Acid 165	2-Naphthylamine-7-sulfonic Acid 404	
	1-Chloro-8-naphthol-5-sulfonic Acid 166	2-Naphthylamine-8-sulfonic Acid 403, 405	
$C_{10}H_7ClO_7S_2$	1-Chloro-8-naphthol-3: 6-disulfonic Acid 164	$C_{10}H_7NO_4S$	1-Amino-2-naphthol-4-sulfonic Acid 67
$C_{10}H_7NO_2$	1-Nitroso-2-naphthol 447		1-Amino-2-naphthol-6-sulfonic Acid 68
$C_{10}H_7NO_3S_3$	1: 8-Naphthasultam-2: 4-disulfonic Acid 351		1-Amino-5-naphthol-7-sulfonic Acid 69
$C_{10}H_8$	Naphthalene 347		1-Amino-8-naphthol-4-sulfonic Acid 69
$C_{10}H_8Cl_2N_2O_4S$	1-(2: 5-Dichloro-4-sulfo-phenyl)-3-methyl-5-pyrazolone 212		1-Amino-8-naphthol-5-sulfonic Acid 71
$C_{10}H_8N_2O_4S$	1-Nitroso-2-naphthylamine-6-sulfonic Acid 448		2-Amino-1-naphthol-4-sulfonic Acid 72
$C_{10}H_8N_2O_6S$	1-Amino-8-nitro-2-naphthol-4-sulfonic Acid 76		2-Amino-3-naphthol-6-sulfonic Acid 72
	1-( <i>p</i> -Sulfo-phenyl)-5-pyrazolone-3-carboxylic Acid 533		Gamma Acid 294
$C_{10}H_8O$	$\alpha$ -Naphthol 359		J Acid 324
$C_{10}H_8O_2$	$\beta$ -Naphthol 361	$C_{10}H_8NO_6S_2$	Amino-G Acid 54
	1: 5-Dihydroxy-naphthalene 222		Amino-R Acid 83
$C_{10}H_8O_4$	2: 7-Dihydroxy-naphthalene 223		Freund's Acid 285
	7: 8-Dihydroxy-4-methylcoumarin 222		1-Naphthylamine-3: 8-disulfonic Acid 393
$C_{10}H_8O_4S$	Croceine Acid 179		1-Naphthylamine-4: 6-disulfonic Acid 394
	1-Naphthol-5-sulfonic Acid 375		1-Naphthylamine-4: 7-disulfonic Acid 394
	2-Naphthol-1-sulfonic Acid 376		1-Naphthylamine-4: 8-disulfonic Acid 395
	2-Naphthol-7-sulfonic Acid 377		1-Naphthylamine-5: 7-disulfonic Acid 395
	Nevile-Winther's Acid 413		2-Naphthylamine-5: 7-disulfonic Acid 396
$C_{10}H_8O_6S$	Schaeffer's Acid 525	$C_{10}H_8NO_7S_2$	1-Amino-8-naphthol-2: 4-disulfonic Acid 63
	1: 7-Dihydroxy-naphthalene-4-sulfonic Acid 224		1-Amino-8-naphthol-3: 5-disulfonic Acid 64
	1: 8-Dihydroxy-naphthalene-4-sulfonic Acid 225		H Acid 298
$C_{10}H_8O_6S_2$	Naphthalene-1: 5-disulfonic Acid 348		K Acid 325
	Naphthalene-1: 6-disulfonic Acid 348		2 R Acid 507
	Naphthalene-2: 7-disulfonic Acid 348	$C_{10}H_8NO_9S_3$	1-Naphthylamine-3: 6: 8-trisulfonic Acid 406
$C_{10}H_8O_7S_2$	G Acid 286		1-Naphthylamine-4: 6: 8-trisulfonic Acid 407
	1-Naphthol-3: 6-disulfonic Acid 369		2-Naphthylamine-3: 6: 8-trisulfonic Acid 407
	1-Naphthol-3: 8-disulfonic Acid 370	$C_{10}H_{10}N_2O$	3-Methyl-1-phenyl-5-pyrazolone 343
	1-Naphthol-4: 8-disulfonic Acid 372	$C_{10}H_{10}N_2O_3S$	1: 3-Naphthylene-diamine-6-sulfonic Acid 409
	2-Naphthol-3: 7-disulfonic Acid 373		1: 4-Naphthylene-diamine-2-sulfonic Acid 410
	R Acid 504		1: 4-Naphthylene-diamine-6-sulfonic Acid 411
$C_{10}H_8O_8S_2$	Chromotropic Acid 173	$C_{10}H_{10}N_2O_4S$	2: 7-Naphthylene-diamine-sulfonic Acid 411
$C_{10}H_8O_8S_3$	Naphthalene-1: 3: 5-trisulfonic Acid 349		3-Methyl-1-( <i>p</i> -sulfophenyl)-5-pyrazolone 344
	Naphthalene-1: 3: 6-trisulfonic Acid 350	$C_{10}H_{10}N_2O_6S_2$	1: 5-Naphthylene-diamine-3: 7-disulfonic Acid 408
$C_{10}H_8O_{10}S_3$	1-Naphthol-3: 6: 8-trisulfonic Acid 379		1: 8-Naphthylene-diamine-3: 6-disulfonic Acid 409
	2-Naphthol-3: 6: 8-trisulfonic Acid 380	$C_{10}H_{11}ClO_4S$	4-Chloro-6-methoxy-3-methylphenyl-thioglycolic Acid 163
$C_{10}H_8N$	Lepidine 331	$C_{10}H_{11}N_2O$	<i>p</i> -Nitroso-diethyl-aniline 438
	$\alpha$ -Naphthylamine 384	$C_{10}H_{11}N_2O_2$	5-Diethylamino-2-nitrosophenol 215
	$\beta$ -Naphthylamine 391		Diethyl-aniline 217
	Quinaldine 501	$C_{10}H_{11}NO$	<i>m</i> -Diethylamino-phenol 215
$C_{10}H_8NO$	5-Amino-1-naphthol 62	$C_{10}H_{11}NO_3S$	Diethyl-aniline- <i>m</i> -sulfonic Acid 218
$C_{10}H_8NO_3S$	Broenner's Acid 152	$C_{10}H_{11}N_2$	<i>N</i> : <i>N'</i> -Diethyl- <i>m</i> -phenylene-diamine 219
	Laurent's Acid 329		<i>N</i> : <i>N'</i> -Diethyl- <i>p</i> -phenylene-diamine 220
	Naphthionic Acid 353	$C_{10}H_{11}N_2O_3S_2$	Diethyl- <i>p</i> -phenylene-diamine-thiosulfonic Acid 220
	1-Naphthylamine-2-sulfonic Acid 398		
	1-Naphthylamine-6-sulfonic Acid 399, 400		
	1-Naphthylamine-7-sulfonic Acid 400, 401		
	1-Naphthylamine-8-sulfonic Acid 402		
	2-Naphthylamine-1-sulfonic Acid 402		
	2-Naphthylamine-5-sulfonic Acid 403		

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$C_{11}H_8O_3$	1-Hydroxy-2-naphthoic Acid 310	$N^7$ -Phenyl-4- <i>m</i> -tolylene-diamine	485
$C_{11}H_8O_3S$	3-Hydroxy-2-naphthoic Acid 310	Diamino-diphenyl-urea-disulfonic Acid	193
	1: 7-Dihydroxy-2-naphthoic-4-sulfonic Acid 227	$C_{14}H_8Br_4N_2O_2$	2: 4: 6: 8-Tetrabromo-1: 5-diamino-anthraquinone 535
$C_{11}H_{10}O_3S_2$	1: 7-Dihydroxy-6-naphthoic-3-sulfonic Acid 228	$C_{14}H_6Cl_2O_2$	1: 5-Dichloro-anthraquinone 207
	5-Ethylmercapto-2-hydroxy-thionaphthene-1-carboxylic Acid 273	$C_{14}H_6N_2O_6$	2: 6-Dichloro-anthraquinone 208
$C_{11}H_{10}O_4S$	5-Ethoxy-2-hydroxy-thionaphthene-1-carboxylic Acid 268	$C_{14}H_6N_2O_4S_2$	2: 7-Dichloro-anthraquinone 208
$C_{11}H_{11}NO_4S$	Methyl-gamma Acid 340		Dinitro-anthraquinones 250
$C_{11}H_{14}ClNO$	<i>p</i> -Diethylamino-benzoyl Chloride 213	$C_{14}H_6N_2O_4S_2$	1: 5-Dinitro-anthraquinone 251
$C_{11}H_{17}NO$	3-Diethylamino- <i>p</i> -cresol 214		4: 8-Dinitro-anthrachrysone-2: 6-disulfonic Acid 249
$C_{11}H_{18}N_2$	<i>p</i> -Amino-benzyl-diethylamine 41	$C_{14}H_7BrO_2$	1-Bromo-anthraquinone 149
$C_{12}H_8O_2$	Acenaphthenequinone 19	$C_{14}H_7Br_2NO_2$	1-Amino-2: 4-dibromo-anthraquinone 50
$C_{12}H_7NO_2$	$\beta$ -Naphthistatin 358	$C_{14}H_7ClO_2$	1-Chloro-anthraquinone 156
$C_{12}H_8N$	Carbazole 154	$C_{14}H_7NO_6$	2-Chloro-anthraquinone 157
$C_{12}H_8N_3O$	2-Amino-8-hydroxy-phenazine 57		Nitro-alizarin ( <i>crude</i> ) 418
$C_{12}H_9N_3O_6$	2: 4-Dinitro-4'-hydroxy-diphenylamine 255	$C_{14}H_7NO_6$	3-Nitro-alizarin 418
$C_{12}H_9N_3O_7S$	2: 4-Dinitro-diphenylamine-3'-sulfonic Acid 254	$C_{14}H_7NO_7$	4-Nitro-alizarin 419
	2: 4-Dinitro-diphenylamine-4'-sulfonic Acid 254	$C_{14}H_7NO_7S$	3-Nitro-flavopurpurin 433
$C_{12}H_9N_3O_{10}S_2$	2: 5-Dinitro-diphenylamine-3: 4-disulfonic Acid 253	$C_{14}H_8BrNO_3$	1-Nitro-anthraquinone-6-sulfonic Acid 427
$C_{12}H_{10}Cl_2N_2$	<i>o</i> : <i>o</i> '-Dichloro-benzidine 210	$C_{14}H_8Br_2N_2O_2$	1-Amino-2-bromo-4-hydroxy-anthraquinone 44
$C_{12}H_{10}N_2O_6S$	Nitro-diphenylamine-sulfonic Acid 433	$C_{14}H_8ClNO_2$	1: 4-Diamino-2: 3-dibromo-anthraquinone 191
$C_{12}H_{10}N_2O_6S_3$	Benzidine-sulfon-disulfonic Acid 136	$C_{14}H_8ClNO_2$	1-Amino-6-chloro-anthraquinone 45
$C_{12}H_{10}N_4O_4$	4'-Amino-2: 4-dinitro-diphenylamine 51	$C_{14}H_8O_2$	Anthraquinone 111
$C_{12}H_{10}O$	3-Hydroxy-acenaphthene 306	$C_{14}H_8O_2S$	Phenanthrene-quinone 458
$C_{12}H_{11}N$	Diphenylamine 261	$C_{14}H_8O_4$	1-(or 2)-Mercapto-anthraquinone 332
$C_{12}H_{11}NO$	<i>m</i> -Hydroxy-diphenylamine 309		Alizarin 24
$C_{12}H_{11}NO_2$	$\alpha$ -Naphthyl-glycine 412	$C_{14}H_8O_5$	Anthrarufin 116
$C_{12}H_{11}NO_3S$	Diphenylamine-sulfonic Acid 262	$C_{14}H_8O_5S$	Quinizarin 502
$C_{12}H_{11}NO_3S_2$	Acetyl-H Acid 22	$C_{14}H_8O_6S$	Purpurin 498
$C_{12}H_{11}N_3$	Amino-azo-benzene 32	$C_{14}H_8O_6S_2$	Anthraquinone-2-sulfonic Acid 114
$C_{12}H_{11}N_3O_2$	<i>o</i> -Nitro-benzidine 431		Anthrachrysone 109
$C_{12}H_{11}N_3O_3$	2-Amino-4'-hydroxy-4-nitro-diphenylamine 56		Anthraquinone-1: 5-and 1: 8-disulfonic Acids 112
$C_{12}H_{11}N_3O_3S$	Amino-azo-benzene-sulfonic Acid 34		Anthraquinone-2: 6-disulfonic Acid 112
$C_{12}H_{11}N_3O_4S_2$	Amino-azo-benzene-disulfonic Acid 33	$C_{14}H_8NO_2$	Anthraquinone-2: 7-disulfonic Acid 113
$C_{12}H_{12}N_2$	<i>o</i> -Amino-diphenylamine 52		1-Amino-anthraquinone 29
	<i>p</i> -Amino-diphenylamine 52	$C_{14}H_8NO_3$	2-Amino-anthraquinone 30
$C_{12}H_{12}N_2O$	Benzidine 125		1-Amino-4-hydroxy-anthraquinone 55
$C_{12}H_{12}N_2O$	4-Amino-4'-hydroxy-diphenylamine 56	$C_{14}H_8NO_4$	3-Amino-alizarin 27
$C_{12}H_{12}N_3O_3S$	<i>p</i> -Amino-diphenylamine-2-sulfonic Acid 53	$C_{14}H_8NO_5$	4-Amino-alizarin 28
	Benzidine-sulfonic Acid 136		1-Amino-4: 5: 8-trihydroxy-anthraquinone 88
$C_{12}H_{12}N_2O_4S$	Acetyl-1: 4-naphthylene-diamine-6-sulfonic Acid 22	$C_{14}H_8NO_5S$	1: 5-and 1: 8-Amino-anthraquinone-sulfonic Acids 31
$C_{12}H_{12}N_2O_6S_2$	Benzidine-disulfonic Acid 135	$C_{14}H_{10}$	Anthracene 308
$C_{12}H_{12}N_2S$	Thioaniline 541	$C_{14}H_{10}N_2O$	2-Isatin Anilide 121
$C_{12}H_{12}N$	Ethyl- $\alpha$ -naphthylamine 275	$C_{14}H_{10}N_2O_2$	Diamino-anthraquinones 189
$C_{12}H_{13}NO$	1-Amino-2-naphthol Ethyl Ether 66		1: 4-Diamino-anthraquinone 187
$C_{12}H_{12}NO_3S$	Ethyl-2-naphthylamine-7-sulfonic Acid 276	$C_{14}H_{10}N_2O_4$	1: 5-Diamino-anthraquinone 188
$C_{12}H_{12}NO_4S$	Dimethyl-gamma Acid 243	$C_{14}H_{10}N_2O_{10}S_2$	4: 8-Diamino-anthrarufin 189
$C_{12}H_{13}N_3$	Ethyl-gamma Acid 272		Dinitro-stilbene-disulfonic Acid 260
$C_{12}H_{13}N_3O$	<i>p</i> : <i>p</i> '-Diamino-diphenylamine 192	$C_{14}H_{10}O$	1-Anthrol 117
	2: 4-Diamino-4'-hydroxy-diphenylamine 197	$C_{14}H_{10}O_2$	9-Anthrol 118
$C_{12}H_{13}N_6$	4-Amino-chrysoidine 47	$C_{14}H_{10}O_3$	1-Hydroxy-anthranol 307
$C_{13}H_{11}NO_4$	Gallanilide 289	$C_{14}H_{10}O_3$	<i>o</i> -Benzoyl-benzoic Acid 140
$C_{13}H_{12}N_3S$	Thio-carbanilide 542	$C_{14}H_{11}N_3O_2$	1: 2: 4-Triamino-anthraquinone 573
$C_{13}H_{13}N$	<i>N</i> -Methyl-diphenylamine 338	$C_{14}H_{12}N_2O_2S_2$	Dehydro-thio- <i>p</i> -toluidine-sulfonic Acid 182
$C_{13}H_{13}NO_3S$	<i>N</i> -Methyl-diphenylamine-sulfonic Acid 339		Dinitro-dibenzyl-disulfonic Acid 252
$C_{13}H_{14}N_2$	<i>p</i> : <i>p</i> '-Diamino-diphenylmethane 192	$C_{14}H_{12}N_2S$	Dehydro-thio- <i>p</i> -toluidine 181
		$C_{14}H_{14}N_2O_2S_2$	Diamino-stilbene-disulfonic Acid 199



PART II

GLOSSARY OF DYE NAMES

AND

PAGE INDEX OF SCHULTZ NUMBERS



## GLOSSARY OF DYE NAMES

The number of dye names in use is very large. Norton, in *Artificial Dyestuffs Used in U. S.*, lists almost six thousand in his index where a number of individual marks are grouped together under the abbreviation V.M. (Various Marks).

The list of dyes in stock in the German dye factories on August 15, 1919, the so-called Reparation Dyes, embrace over seven thousand marks.

Throughout Germany, Switzerland, United States, France and England, there are probably twelve thousand different dye marks in use, many of these being for the same chemical compound of the same or different degrees of purity.

This glossary is based largely upon the list given in the index of Dr. Thomas H. Norton's *Artificial Dyestuffs Used in the U. S.*, which is given by permission. A number of corrections have been made to this list and a great number of additions. These additions comprise all dye names first given in Schultz's *Farbstofftabellen*, and many more from various other sources. However, a number of the separate marks for a given name are often here listed on the same line to save space.

The new American and English names that have arisen during the last few years have not been included, due to difficulty of adequately translating them.

In this glossary copies Norton in assigning Schultz numbers followed by letters to dyes closely related to a given Schultz Dye. Norton's practice regarding dyes of unknown composition is also used, the numbers employed being the same as given in Norton. Hence ready reference can be made to Norton's book for statistical information concerning these dyes of unknown composition, which could not be classified in these tables. Some of Norton's dyes of unknown composition have been identified and the proper Schultz number assigned.

Under Serial Number Column those numbers without any letter added refer to Schultz Numbers; those with a prefix of A, S, or U refer to Azo, Sulfur or unclassified dyes of unknown composition.

V.M. is used for Various Marks as applied to dye names, and Var. for various manufacturers and is employed rather than list a considerable number of manufacturers for a given dye.

The following abbreviations are used for manufacturers.

- A . . . . . Actien-Gesellschaft für Anilin-Fabrikation, Berlin  
 AW . . . . . A. Wiescher & Co., Successors, Haeren, Belgium  
 B . . . . . Badische Anilin- und Soda-Fabrik, Ludwigshafen  
 BrAlizCo. British Alizarin Co.  
 BD . . . . . British Dyes, Ltd., Huddersfield  
 BK . . . . . Leipziger Anilinfabrik Beyer & Kegel, Fürstenberg  
 By . . . . . Farbenfabriken vorm. F. Bayer & Co., Leverkusen  
 ByCo. . . . Bayer & Co., Rensselaer, N. Y.  
 C . . . . . Leopold Cassella & Co., Frankfort on the Main  
 ClCo . . . . Clayton Aniline Co., Clayton near Manchester  
 CDCo . . . . Central Dyestuff Co., Newark, N. J.  
 CG . . . . . Chemikalienwerk Griesheim, Griesheim on the Main  
 CJ . . . . . Carl Jäger Anilinfarbenfabrik, Düsseldorf  
 CR . . . . . Clauss & Co. (formerly Claus & Rée), Clayton near Manchester  
 CV . . . . . Colne Vale Chemical Co., Milnsbridge near Huddersfield  
 DH . . . . . Farbwerke vorm. L. Durand, Huguenin & Co., Germany and  
                   France  
 FA . . . . . Farbwerk Ammersfoort, Ammersfoort, Netherlands  
 G . . . . . Geigy, Basel  
 GrE . . . . . Chemische Fabrik Griesheim-Elektron, Offenbach on the Main  
 H . . . . . Read Holliday & Sons, Huddersfield  
 H&M . . . . Heller & Merz Co., Newark, N. J.  
 I . . . . . Gesellschaft für chemische Industrie, Basel  
 K . . . . . Kalle & Co., Biebrich on the Rhine  
 Ki . . . . . Kinzlberger & Co., in Prague  
 L . . . . . Farbwerk Mülheim vorm. A. Leonhardt & Co., Mülheim  
 Lev . . . . . Levenstein, Ltd., Crumpsall Vale  
 M . . . . . Farbwerke vorm. Meister Lucius & Brüning, Höchst  
 NF . . . . . Niederländesche Farben- und Chemikalienfabrik Delft, Delft.  
 P . . . . . Société Anonyme des Matières colorantes et produits chimiques  
                   St. Denis (formerly A. Poirrer), St. Denis  
 Q . . . . . Imports of Unknown Source  
 S . . . . . Chemische Fabrik vorm. Sandoz & Co. Basel  
 Sch . . . . . Schoellkopf Aniline & Chemical Works, Buffalo, now National  
                   Aniline & Chemical Co.  
 tM . . . . . Chemische Fabriken vorm. Weiler-ter-Meer, Uerdinger  
 WB . . . . . W. Beckers Aniline and Chemical Works, Brooklyn  
 WD . . . . . Wülfig Dahl & Co., Barmen

*Note.* Within the past few years many of these companies have consolidated or changed names.

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Acetyl Red GX.....	B	U90	Acid Brown G.....	tM,BK	212
Acetylene Blue 3 B.....	G	U648	Acid Brown R.....	K	212a
Acetylene Blue 6 B.....	G	U649	Acid Brown RN.....	G	212a
Acid Alizarin Black.....	M	159	Acid Brown SR.....	K	212a
Acid Alizarin Black R.....	M	159	Acid Brown V.....	I	212a
Acid Alizarin Black SE.....	M	288	Acid Brown Y.....	P	212
Acid Alizarin Black SN.....	M	289	Acid Chrome Black G.....	I	A147a
Acid Alizarin Black SR.....	CV	288a	Acid Chrome Black LG.....	By	A147
Acid Alizarin Brown B.....	B	154	Acid Chrome Black RH.....	By	A148
Acid Alizarin Blue.....	...	790	Acid Chrome Black RH.....	G	A610
Acid Alizarin Blue BB, GR.....	M	790	Acid Chrome Black RHN.....	BK	A148a
Acid Alizarin Garnet.....	...	155	Acid Chrome Black WS.....	By	A149
Acid Alizarin Garnet R.....	M	155	Acid Chrome Black 1551.....	CV	A723
Acid Alizarin Green B, G.....	M	796	Acid Chrome Blue.....	K	U302
Acid Alizarin Green 3 G.....	I	796a	Acid Chrome Blue (reddish).....	AW	A532
Acid Alizarin Red B.....	M	202	Acid Chrome Red B.....	By	U209
Acid Alizarin Violet N.....	M	294	Acid Chrome Blue B.....	CV	A724
Acid Alizarin Yellow GGW.....	M	156	Acid Chrome Blue 3 G.....	By	U206
Acid Anthracene Brown.....	By	88	Acid Chrome Red N.....	CV	A725
Acid Anthracene Brown M, P.....	By	88a	Acid Chrome Blue 2 R.....	By	U207
Acid Anthracene Brown PG.....	By	88a	Acid Chrome Blue 5 R.....	By	U208
Acid Anthracene Brown R.....	By	88	Acid Chrome Violet R.....	By	U210
Acid Anthracene Brown			Acid Corinth.....	tM	U522
RH, W.....	By	88a	Acid Coriuth 240 S.....	G	U602
Acid Anthracene Brown			Acid Cresol Black 4196.....	GrE	U501
WSG.....	By	88a	Acid Crimson.....	S	166a
Acid Anthracene Red 3 B.....	By	400	Acid Crimson D.....	Q	166a
Acid Anthracene Red 5 BL, G.....	By	400a	Acid Cyanine BF.....	A	705b
Acid Black.....	AW	217e	Acid Dark Green.....	I	505b
Acid Black AO.....	I	217e	Acid Eosine.....	...	590
Acid Black AS.....	Q	269e	Acid Eosine CA, G.....	B	590a
Acid Black 10 B.....	WB	217	Acid Eosine 3 G.....	CJ	590a
Acid Black 6 BA.....	CG	217e	Acid Eosine I, new, LB.....	B	590a
Acid Black 4 BD.....	I	217e	Acid Eosine L 27314, SP.....	B	590a
Acid Black BR.....	G	269e	Acid Eosine 1632.....	K	590a
Acid Black BR.....	tM	269	Acid Eosine 13389.....	CJ	590a
Acid Black D.....	I	217e	Acid Fast Blue SB.....	WB	189
Acid Black E.....	By	A144	Acid Fast Blue SL.....	WB	188
Acid Black EW.....	Q	269e	Acid Fast Green 8 B.....	AW	A533
Acid Black G, HA, HAS.....	I	217e	Acid Fast Violet.....	AW	U551
Acid Black H.....	S	217e	Acid Fuchsine.....	...	524
Acid Black KB.....	Q	269e	Acid Green.....	I	504
Acid Black M.....	By	A145	Acid Green.....	tM	502a
Acid Black M.....	BK	217e	Acid Green.....	WD	505
Acid Black M.....	H	269e	Acid Green (V. M.).....	C	505a
Acid Black SO.....	S	217e	Acid Green 2 A, B, 2 BA.....	tM	502a
Acid Black 32.....	H	269e	Acid Green 2 B.....	P	502
Acid Black 2034.....	K	217e	Acid Green 6B, BW.....	...	504
Acid Black 2195.....	BK	217e	Acid Green 2 BG.....	tM	502
Acid Blue.....	AW	543c	Acid Green G.....	K	505
Acid Blue.....	H&M	539	Acid Green GG.....	By	505
Acid Blue.....	K	U301	Acid Indigotine.....	...	877
Acid Blue greenish.....	K	U301	Acid Kraft Brown.....	B	U91
Acid Blue B.....	S	565	Acid Magenta.....	By,C	524
Acid Blue 7 B.....	S	565b	Acid Magenta.....	II, Sch	524
Acid Blue BA, C, DRS.....	Q	543c	Acid Magenta 6 B.....	CV	524
Acid Blue E.....	AW	543c	Acid Magenta B, F.....	G	524
Acid Blue EX.....	S	565b	Acid Magenta FCNS.....	GrE	524
Acid Blue OG.....	K	U301	Acid Magenta G.....	G	524
Acid Blue AG.....	Q	U301	Acid Magenta O.....	M	524
Acid Blue PN.....	Q	543c	Acid Magenta S.....	A,B	524
Acid Blue R.....	AW	543c	Acid Magenta S.....	GrE	524
Acid Blue R.....	S	565b	Acid Magenta 2.....	CV	524
Acid Blue 5 R.....	Q	543c	Acid Magenta Crystals I.....	CV	524
Acid Blue RBF.....	...	562	Acid Milling Black B.....	...	265
Acid Blue V.....	AW	543	Acid Milling Red G.....	...	293
Acid Blue Y.....	AW	543c	Acid Milling Scarlet.....	ClCo	484
Acid Blue 466.....	M	U400	Acid Navy Blue SL.....	AW	A534
Acid Blue 22244.....	S	565b	Acid Olive 2764.....	K	U303
Acid Blue 25579.....	S	565b	Acidol Azo Violet R.....	tM	A512
Acid Blue Black.....	AW	A531	Acidol Azo Violet S.....	tM	A513
Acid Brilliant Red 2 B.....	By	A146	Acidol Fast Violet A 2 R.....	tM	A514
Acid Brown.....	C	U273	Acidol Violet BR.....	tM	U523

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Acid Phosphine R.	CR	606d	Acid Violet C2B, C10B.	B	530a
Acid Pure Blue R.	G	U603	Acid Violet C10B.	AW	530a
Acid Pure Blue RC.	G	U604	Acid Violet D.	S	561a
Acid Purple.	Q	U774	Acid Violet HB.	H	534a
Acid Red 2 B, 4 B.	K	U304	Acid Violet HW.	By	527a
Acid Red 6 BF.	BK	U478	Acid Violet KB.	K	530a
Acid Red CB.	Q	U775	Acid Violet NFDS.	H	534a
Acid Red FL.	S	U694	Acid Violet NG.	K	530a
Acid Red G.	K	U304	Acid Violet PW.	B	530a
Acid Red G.	Q	U776	Acid Violet R.	By	527a
Acid Red 3 G.	K	U304	Acid Violet R.	G	530a
Acid Red R.	K	U304	Acid Violet R.	Q	530a
Acid Red 4 R.	K	U304	Acid Violet 4 R.	B	530a
Acid Red S.	AW	A536	Acid Violet 4 R.	By	527a
Acid Red 3 S.	K	U304	Acid Violet 4 R.	I	534a
Acid Red C19.	K	U304	Acid Violet 4 RN.	K	530a
Acid Red 1622.	K	U304	Acid Violet 4 RS.	M	526
Acid Red 1642.	K	U304	Acid Violet RX.	H	534a
Acid Red 1645.	K	U304	Acid Violet S.	S	561a
Acid Rhodamine B.	B	U92	Acid Violet SB.	Q	530a
Acid Rhodamine 3 B.	B	U93	Acid Violet 1704.	K	530a
Acid Rhodamine BG.	B	U94	Acid Violet 2405.	tM	530a
Acid Rhodamine G.	B	U95	Acid Violet 4746.	BK	530a
Acid Rhodamine R.	B	U95	Acid Violet 10471.	I	534a
Acid Rosamine A.	M	583	Acid Violet 10475.	I	534a
Acid Rubine.	CJ	524	Acid Violet 18502.	I	534a
Acid Scarlet G.	Q	U777	Acid Violet 26449.	S	561a
Acid Scarlet 2 R.	Q	U778	Acid Violet Blue.	Q	U781
Acid Scarlet SG.	A	U779	Acid Violet Red.	Q	U782
Acid Silk Black R.	By	A150	Acid Wool Black.	Q	217h
Acid Silver Black R.	By	A150	Acid Yellow.	A,AW	137
Acid Silver Gray.	Q	U780	Acid Yellow AC.	K	137
Acid Sky Blue.	AW	A535	Acid Yellow D.	A	139
Azo Violet.	By, etc.	407	Acid Yellow F.	H	137
Acid Violet (V. M.).	C	530a	Acid Yellow G.	A, BK	137
Acid Violet B.	BK	530a	Acid Yellow G.	Q, S	137
Acid Violet BB.	R, K	530a	Acid Yellow GG.	GrE	136
Acid Violet 2 B.	H	534a	Acid Yellow GF.	H	137
Acid Violet 4 B.	By, K	530	Acid Yellow LR.	K	137
Acid Violet 4 B.	Var.	530	Acid Yellow MGS.	GrE	136
Acid Violet 5 B.	AW, By	530	Acridine Golden Yellow.	G	602a
Acid Violet 5 B.	G, K	530a	Acridine Golden Yellow		
Acid Violet 6 B.	A, By	529	54666A.	L	602a
Acid Violet 6 B.	G, tM	530	Acridine Golden Yellow, G,		
Acid Violet 6 B.	H	548	GG, W.	L	602
Acid Violet 7 B.	AW	527	Acridine Orange.	DH	603
Acid Violet 7 B.	B, H, I	534	Acridine Orange NOO, NO.	L	603
Acid Violet 7 B.	K	530a	Acridine Orange R.	L	604
Acid Violet 8 B.	By	527a	Acridine Red B.	L	569
Acid Violet 4 BC.	B	530	Acridine Yellow.	L	602
Acid Violet 5 BF.	M	530a	Afghan Yellow GX.	BD	9
Acid Violet 4 BL.	B	530a	Agalma Black 4 BX.	B	217a
Acid Violet 4 BLO.	B	530a	Agalma Black 10 BX, 10 B.	B	217
Acid Violet 4 BLOO.	K	530a	Agalma Black 201211.	B	217a
Acid Violet 4 BLOOF.	B	530	Agalma Black Green T.	B	217b
Acid Violet 4 BN.	B, I	527	Agalma Green B.	B	542
Acid Violet 6 BN.	B, M	548	Algol Blue G.	By	844a
Acid Violet 6 BN.	I, WD	548	Algol Blue 3 G.	By	844
Acid Violet 6 BN.	tM	530	Algol Blue K.	By	839
Acid Violet 7 BN.	By	527	Algol Blue 3 R, 3 RP.	By	821
Acid Violet 7 BN.	M	533	Algol Bordeaux 3 B.	By	829
Acid Violet 6 BNB.	By	527	Algol Brilliant Orange FR.	By	822
Acid Violet 6 BNG.	G	530	Algol Brilliant Red 2 B.	By	819
Acid Violet 3 BNO.	B	530a	Algol Brilliant Violet 2 B.	By	821
Acid Violet 6 BNO.	B	530a	Algol Brilliant Violet R.	By	820
Acid Violet 6 BNOO.	K	530a	Algol Brown B.	By	869
Acid Violet 4 BNS.	S	527	Algol Brown R.	By	869a
Acid Violet 5 BNS.	S	561	Algol Corinth R.	By	870
Acid Violet 4 BS.	Q	530	Algol Dark Green B.	By	847a
Acid Violet 6 BS.	WD	548	Algol Gray.	By	834
Acid Violet BSC.	K	530a	Algol Gray B, BB.	By	834
Acid Violet 4 BV.	AW	530a	Algol Green B.	By	847
Acid Violet BW.	By	527a	Algol Olive R.	By	833

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Orange R.	By	824	Alizarin Blue C 2 G.	...	799
Pink R.	By	818	Alizarin Blue CWRB,		
Red B.	By	825	CWRR.	...	788
Red BB, FF.	By	819	Alizarin Blue DH6 GM, DN	M	803a
Red 2 G, 3 G.	By	816a	Alizarin Blue D 2 R, D 4 R.	M	803a
Red 5 G.	By	816	Alizarin Blue GR, GW.	M	803a
Red, FF, R.	By	819	Alizarin Blue GWDS, HJ.	By	803a
Scarlet G.	By	815	Alizarin Blue IIX.	By	803a
Violet B.	By	823	Alizarin Blue JR.	By	852
Yellow 3 G.	By	811	Alizarin Blue NFA, NEN.	By	803a
Yellow 6 GL.	By	811a	Alizarin Blue NS.	By	788
Yellow R.	By	817	Alizarin Blue NSG.	By	803a
Yellow WF, WG.	By	814	Alizarin Blue S.	Var.	804
Indine Black.	H	U744	Alizarin Blue SAE.	By	858
Indine Black M.	II	U744	Alizarin Blue SAP.	By	858
Indine Deep Brown 3 R.	H	U745	Alizarin Blue SAWSA.	By	804
Indine Orange M.	...	779	Alizarin Blue SB.	M	804a
Indine Yellow Y.	H	U746	Alizarin Blue SRM.	M	804
Indine Orange.	H	U748	Alizarin Blue WG.	...	803
Indine paste.	Br.Aliz.	778	Alizarin Blue WX.	B	803
Indine powder.	Co.		Alizarin Blue 942.	M	804a
Indine 11 AB.	By	778	Alizarin Blue (violet shade).	S	803a
Indine D 1140.	M	778	Alizarin Blue (violet shade) P	S	803a
Indine D 1149.	M	778	Alizarin Blue Black.	...	862
Indine D 1399.	M	778	Alizarin Blue Black B.	CV, M	774a
Indine DCR.	M	806a	Alizarin Blue Black B.	Q	862
Indine GD.	B	784	Alizarin Blue Black B, 3 B.	By	862
Indine GGX.	By	785a	Alizarin Blue Black B, 3 B.	M	862
Indine GI.	B	785	Alizarin Blue Black GT.	B	774a
Indine I.	M	778	Alizarin Bordeaux.	...	787
Indine IB.	By, M	778	Alizarin Bordeaux B, BD.	By	787
Indine IT.	By	778	Alizarin Brown.	M	782
Indine IT.	M	778	Alizarin Brown B, D3GO, G	M	782
Indine IWS.	M	780	Alizarin Brown DR, N, RR.	M	782
Indine RG.	B	785	Alizarin Brown O.	Q	782
Indine RVT.	By	784a	Alizarin Claret R.	M	797
Indine S.	By	784b	Alizarin Claret Red DB.	M	U405
Indine SDG.	M	785	Alizarin Claret Red DG.	M	U406
Indine SX.	B	784	Alizarin Chrome Blue T.	S	803b
Indine SXGD.	B	784	Alizarin Chrome Brown DG.	M	U402
Indine V 1, V 2 A.	B	778	Alizarin Chrome Brown DR.	M	U403
Indine W.	By	780	Alizarin Crimson DB.	M	U407
Indine 11 X.	By	778	Alizarin Crimson DG.	M	U408
Indine XGP.	By	785a	Alizarin Chrome Green A.	...	260
Indine XP.	By	785a	Alizarin Cyanine G, 2 G, 3 G	By	799
Indine 744, 1140.	M	778	Alizarin Cyanine R.	By	788
Indine Astrol B, G.	By	856	Alizarin Cyanine WRR.	By	788
Indine Azurine D 3 R.	M	U401	Alizarin Cyanine Green E		
Indine Black (V.M.).	B	774	(& V.M.).	By	865
Indine Black (V.M.).	C	774b	Alizarin Cyanole B.	...	851
Indine Black AB.	AW, CV	774b	Alizarin Dark Blue DR, S.	M	804b
Indine Black AC.	M	806a	Alizarin Dark Green W.	B	775
Indine Black B, 3 B.	By	774b	Alizarin Direct Blue B.	M	851
Indine Black B.	AW	774b	Alizarin Direct Blue EB.	M	851a
Indine Black DES, EN.	M	806a	Alizarin Direct Blue ESP.	M	851a
Indine Black ENT.	M	806a	Alizarin Direct Blue ESR.	M	851a
Indine Black IA.	By	774b	Alizarin Direct Cyanine FA.	M	U409
Indine Black P.	M	806	Alizarin Direct Green CG, G	M	865
Indine Black R.	M	806a	Alizarin Direct Violet R.	M	852
Indine Black S.	B	774	Alizarin Direct Yellow DR.	M	U410
Indine Black S, SE.	M	807	Alizarin Direct Yellow DS.	M	U411
Indine Black SET, SN.	M	807	Alizarin Fast Blue DGL.	M	U412
Indine Black SNT.	M	807	Alizarin Fast Brown DB.	M	U413
Indine Black SR, WR.	B	774	Alizarin Fast Brown D 3 R.	M	U414
Indine Blue (V.M.).	C	803a	Alizarin Fast Brown 3 R.	M	U415
Indine Blue A, AS.	By	803a	Alizarin Fast Gray DBL.	M	U416
Indine Blue A.	M	803	Alizarin Fast Orange DO.	M	U417
Indine Blue B.	M	803a	Alizarin Fast Red D 244.	M	U418
Indine Blue BB, DB.	M	803a	Alizarin Fast Scarlet D 6 BS.	M	U419
Indine Blue BR, BR 3 G.	By	803a	Alizarin Fast Scarlet D 8 BS.	M	U420
			Alizarin Garnet.	AW	797
			Alizarin Garnet R.	M	797

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Alizarin Gray.....	C	774d	Alkali Blue.....	ByCo	
Alizarin Gray G.....	M	U421	Alkali Blue.....	H&M	536
Alizarin Green B.....	WD	657	Alkali Blue.....	Var.	536
Alizarin Green BB.....	M	805	Alkali Blues, green shades..	Sch	536
Alizarin Green CE, CK....	By	808a	Alkali Blues, red shades....	Sch	536
Alizarin Green C, CG.....	By	865	Alkali Blue (V.M.).....	C	536
Alizarin Green DGN, DMA	M	805	Alkali Blue (for printing ink)	G, tM	536
Alizarin Green G.....	WD	656	Alkali Blue III.....	A	536
Alizarin Green 3 G, S.....	M	805	Alkali Blue IV A.....	M	536
Alizarin Green S.....	B	808	Alkali Blue 2 AS.....	M	536
Alizarin Green SP 4.....	By	868a	Alkali Blue AWG, AWR.....	M	536
Alizarin Green SW.....	M	805	Alkali Blue AWRG.....	M	536
Alizarin Green V, VD.....	By	808a	Alkali Blue 2 B.....	A, B	536
Alizarin V 3 W.....	B	778	Alkali Blue 2 B.....	M, tM	536
Alizarin Green WB.....	M	805	Alkali Blue 3 B.....	S, tM	536
Alizarin Green X.....	B	808	Alkali Blue 4 B.....	I, M	536
Alizarin Indigo B.....	By	894	Alkali Blue 5 BA.....	B	536
Alizarin Indigo G.....	By	893	Alkali Blue BK 2.....	K	536
Alizarin Indigo 3 R.....	By	895	Alkali Blue 5 BL.....	B	536
Alizarin Indigo Blue S.....	B	809	Alkali Blue 7 BOO.....	GrE	536
Alizarin Indigo Green B.....	By	894a	Alkali Blue D.....	A	535
Alizarin Indigo Violet B....	By	894b	Alkali Blue H 5 BK000.....	GrE	536
Alizarin Irisol D, R.....	Q	852	Alkali Blue HEOOO.....	GrE	536
Alizarin Lake.....	Q	U783	Alkali Blue HERR000.....	GrE	536
Alizarin Light Red D 8 BW	M	U422	Alkali Blue I.....	A	536
Alizarin Milling Black 8 B..	AW	774c	Alkali Blue MN.....	M	536
Alizarin Maroon W.....	B	798	Alkali Blue N.....	B	536
Alizarin Orange.....	M, etc.	779	Alkali Blue R.....	I	536
Alizarin Orange A.....	B	779	Alkali Blue 3 R, 5 R, 6 R..	tM	536
Alizarin Orange DG, DN, GR	M	779	Alkali Blue RM, RRM.....	M	536
Alizarin Orange R.....	By	779	Alkali Blue 2.....	M	536
Alizarin Pure Blue B.....	By	855	Alkali Blue 1756.....	K	536
Alizarin Pure Blue DPH.....	M	U423	Alkali Blue 1757.....	K	536
Alizarin Pure Yellow DHS...	M	U424	Alkali Blue 11408.....	B	536
Alizarin Red (V.M.).....	By	780	Alkali Brilliant Blue G.....	WD	536a
Alizarin Red (yellow).....	M	780a	Alkali Brown.....	WD	190
Alizarin Red D4B, D10B, DG	M	780a	Alkali Dark Brown GV.....	WD	331
Alizarin Red G.....	M	786	Alkali Fast Green 3 G.....	By	U213
Alizarin Red IWS.....	M	780	Alkali Fast Yellow.....	WD	199a
Alizarin Red SWB, SWBB...	B	780	Alkali Green D.....	...	475
Alizarin Red SWR, WB.....	B	780	Alkali Orange GT.....	...	392
Alizarin Red SX.....	B	784	Alkali Rubine.....	WD	U539
Alizarin Red 3 WS.....	M	786	Alkali Violet.....	K	532
Alizarin Red YCA.....	Br. Aliz.	785	Alkali Violet AS.....	M	532
Alizarin Rose GWG.....	Q	U784	Alkali Violet 6 B.....	B	532
Alizarin Rubinol 5 G, R.....	By	856a	Alkali Violet 6 BO.....	B	532
Alizarin Saphirol B, SE.....	By	858	Alkali Violet LR.....	By	U214
Alizarin Sky Blue B.....	By	855	Alkali Violet 421.....	K	532
Alizarin Uranol 12 B.....	By	U211	Alkali Yellow.....	AW	199
Alizarin Uranol R.....	By	U212	Alkali Yellow R.....	WD	350
Alizarin Violet (V.M.).....	C	599	Alpha Black 6 BN.....	CV	U716
Alizarin Violet BL.....	Q	599	Alpha Black JC.....	CV	U717
Alizarin Violet DH.....	M	599	Alpha Chrome Blue A.....	CV	U718
Alizarin Viridine DG, FF...	By	854	Alpha Chrome Brown 6 GA	CV	U719
Alizarin Violet N.....	M	599	Alpha Chrome Brown N.....	CV	U720
Alizarin Yellow A.....	B	770	Alpha Chrome Green 6 B.....	CV	U721
Alizarin Yellow C.....	B	769	Alpha Chrome Orange RK.....	CV	U722
Alizarin Yellow CY.....	By	48	Alpha Chrome Red 3 B.....	CV	U723
Alizarin Yellow DGC, D 3 G	M	48	Alpha Chrome Yellow C.....	CV	U724
Alizarin Yellow DOG, DOO,			Alphanol Black (V.M.).....	C	A303
DR.....	M	48	Alphanol Blue (V.M.).....	C	257
Alizarin Yellow FF.....	WB	48	Amaranth.....	C, etc.	168
Alizarin Yellow FS.....	DH	482	Amaranth.....	CDCo	168
Alizarin Yellow G.....	S	48	Amaranth B.....	C	168
Alizarin Yellow GG.....	By, I, M	48	Amaranth D.....	BK	168
Alizarin Yellow 5 G.....	I, M	48	Amaranth DE.....	B	168
Alizarin Yellow GWG.....	M	48	Amaranth SA.....	tM	168
Alizarin Yellow O.....	M	58a	Amethyst Violet.....	K	686
Alizarin Yellow R.....	Var.	58	Amido Acid Black B, 4 B, BS	A	220a
Alizarin Yellow 3 RN.....	M	58	Amido-azo-benzene.....	Var.	31
Alizarin Yellow RW.....	M	58	Amido Azo Black.....	M	A413
Alkali Azurine G.....		410	Amido-azo-toluene.....	CDCo	68
Alkali Black.....	WD	U538	Amido Black A 2 G.....	M	217f

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Amido Black 10 B.....	M	217	Anthracene Chrome Red		
Amido Black 4024.....	M	217f	(V.M.).....	C	A326
Amido Blue B.....	M	U425	Anthracene Dark Blue W.....	B	790b
Amido Blue GGR.....	M	U426	Anthracene Direct Green.....	C	U274
Amido Dark Bottle Green B.....	M	U427	Anthracene Red.....	By, I	355
Amido Gallamine Blue.....	DH	638	Anthracene Red WB.....	B	355
Amido Naphthol Black 4 B.....	M	A414	Anthracene Red 10430.....	I	355
Amido Naphthol Black RK.....	M	A415	Anthracene Violet.....	I	599
Amido Naphthol Red 2 B.....	M	66a	Anthracene Yellow.....	By	773
Amido Naphthol Red 6 B.....	M	66	Anthracene Yellow (V.M.).....	C	177a
Amido Naphthol Red G.....	M	42	Anthracene Yellow C.....	By, etc.	294
Amido Red BL.....	M	A416	Anthracene Yellow C.....	BK	294
Amido Yellow E.....	M	A417	Anthracene Yellow G.....	I	773a
Amine Black 4 B.....	A	U64	Anthracene Yellow RN, 3 lt N.....	M	58b
Amine Black 10 B.....	A	U65	Anthracene Red A.....	L	A501
Amine Black 4 BM.....	A	U66	Anthracite Black.....	C	267
Amine Black S 4 B.....	A	U67	Anthracene S, SR.....	...	627
Amine Black SL.....	A	U68	Anthracene S, SR.....	CV	A726
Amine Black Green B.....	A	U69	Anthracene Blue 2 B.....	tM	A524
Amine Red.....	A	U70	Anthracene Chrome Blue D.....	tM	A525
Aniline Black.....	Var	922	Anthracene Chrome Brown D.....	WD	154
Aniline Black 15908.....	B	922	Anthracene Chrome Green A, D.....	WD	91
Aniline Blue, Spirit Soluble.....	Var	521	Anthraflavone G.....	B	750
Aniline Blue B.....	tM	521	Anthraol Green B.....	WD	U540
Aniline Blue 2 B.....	A	521	Anthraquinone Black.....	B	749
Aniline Blue 3 B, RN.....	tM	521	Anthraquinone Blue SR.....	B	861
Aniline Blue 6416.....	CG	521	Anthraquinone Blue Green		
Aniline Red B.....	I	512	BXO.....	B	863
Aniline Yellow.....	B	6	Anthraquinone Green		
Aniline Yellow.....	Q	6	GXNO, GX.....	B	864
Anthosine B.....	B	U97	Anthraquinone Violet.....	B	863
Anthosine 3 B.....	B	U98	Anthrarubine 395.....	K	U305
Anthosine 5 B.....	B	U99	Apollo Red B.....	G	54
Anthracene Acid Black			Apollo Red G.....	G	54
(V.M.).....	C, etc.	277	Archil Substitute V.....	P	52
Anthracene Acid Blue (V.M.).....	C	A311	Archil Substitute 3 VN.....	P	53
Anthracene Acid Brown.....	...	221	Artificial Silk Black R.....	By	U216
Anthracene Acid Brown B.....	M, C	492	Artificial Silk Black G.....	By	U215
Anthracene Acid Brown G, R.....	C	221	Auracene G.....	By	494
Anthracene Acid Green.....	G	U650	Auramine.....	Var	493
Anthracene Acid Red 3 B.....	...	355	Auramine G.....	I, B	494
Anthracene Black FF.....	C	A312	Auramine G.....	tM, C	494
Anthracene Blue.....	Var	800	Auramine N.....	S	493
Anthracene Blue 3 G.....	M	800a	Auramine O.....	By, I	493
Anthracene Blue SWG.....	B	790a	Auramine OO.....	G	493
Anthracene Blue SWGG, SWR.....	B	790a	Auramine OO 3, OO 4.....	K	493
Anthracene Blue SWX.....	B	790	Auramine OOD.....	B, K	493
Anthracene Blue WB, WG.....	B	800	Auramine OOP.....	I	493
Anthracene Blue WGG.....	B	801	Auramine OEA.....	B	493
Anthracene Blue WN.....	B	790a	Auramine 23112.....	K	493
Anthracene Blue WR, W 3 R.....	B	789	Auramine base.....	K	493
Anthracene Blue WG new.....	B	802	Aurine.....	B, etc.	555
Anthracene Blue Black			Auro Pavine KR.....	M	609c
(V.M.).....	C	181a	Auronal Black.....	tM	722
Anthracene Brown.....	B	782	Auronal Black 3 A, 4 A.....	G	722a
Anthracene Brown G, R.....	By	782a	Auronal Black 4 A, 4 G, 5 G.....	tM	722a
Anthracene Brown RH.....	H	782	Auronal Black B.....	tM	727
Anthracene Brown VV.....	By	782a	Auronal Black N 2 R.....	tM	722
Anthracene Brown SW.....	B	782	Auronal Black 3.....	tM	722a
Anthracene Chromate Brown			Auronal Blue D.....	tM	S137
(V.M.).....	C	A318	Auronal Green TA.....	tM	S138
Anthracene Chromate Green			Auronal Orange R.....	tM	S140
FF.....	C	865	Auronal Orange S.....	tM	S139
Anthracene Chromate Yellow			Aurophosphine G, 4 G.....	A	600a
Anthracene Chrome Blue			Austrian Black.....	Q	U785
(V.M.).....	C	A313	Autogene Black.....	P	732
Anthracene Chrome Black			Autogene Black EEB.....	P	723
(V.M.).....	C	185	Autol Red BL.....	B	56
Anthracene Chrome Black			Autol Red RL, RLP.....	B	106
FF ex.....	C	185	Azarine S.....	M	86
Anthracene Chrome Brown.....	C	A323	Azidine Blue B, BALG.....	CJ	410
Anthracene Chrome Green.....	C	A325	Azidine Blue 3 B.....	CJ	391
			Azidine Blue BAN.....	CJ	410

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Azidine Blue BX.....	CJ	386	Azo Fuchsine GN.....	By	147
Azidine Blue 24574.....	CJ	410	Azo Galleine.....	G	62
Azidine Bordeaux G.....	CJ	313	Azo Green.....	By	510
Azidine Dark Brown.....	CJ	A454	Azo Indigine 6 B.....	AW	A537
Azidine Fast Orange ES.....	CJ	A455	Azo Indigine S.....	AW	A538
Azidine Fast Scarlet 4 BS.....	CJ	281	Azo Indigine 419, 420.....	K	A390
Azidine Fast Scarlet 7 BS.....	CJ	282	Azo Magenta 6 BX.....	B	A 67
Azidine Fast Scarlet E 4 BS.....	CJ	A456	Azo Magenta G.....	CV	146
Azidine Fast Scarlet GGS.....	CJ	280	Azo Magenta RS.....	B	A68
Azidine Orange G.....	CJ	392	Azo Mauve B.....	GrE	382
Azidine Sky Blue FF.....	CJ	424	Azo Merino Black.....	C	A333
Azidine Yellow CP.....	CJ	304	Azo Milling Yellow 5 G.....	GrE	A457
Azidine Wool Blue B.....	CJ	420	Azomine Black FF.....	CV	A727
Azo Acid Black B 15.....	M	A418	Azomine Fast Yellow AL.....	CV	A728
Azo Acid Black 3 BL.....	M	A419	Azomine Milling Black N.....	CV	A729
Azo Acid Black R.....	M	A420	Azomine Yellow G.....	Q	U786
Azo Acid Black TL II.....	M	A421	Azomine Yellow R.....	Q	U787
Azo Acid Blue.....	M	63	Azo Orange Rubine.....	M	A423
Azo Acid Blue B.....	K, M	63	Azo Orseille 2 B.....	C	A334
Azo Acid Blue B.....	S	63	Azo Orseille R.....	A	44
Azo Acid Blue 2 G.....	By	63a	Azo Orseille.....	FA	312a
Azo Acid Brown 26049.....	By	A151	Azophor Black S.....	M	408
Azo Acid Magenta G.....	M	64b	Azophor Blue D.....	M	408
Azo Acid Red B.....	M	64	Azophor Orange MN.....	M	46
Azo Acid Red 5 B.....	M	64a	Azo Phosphine GO.....	M	60
Azo Acid Red BA.....	M	64	Azo Red A.....	C, A	165
Azo Acid Rubine.....	WD	163	Azo Rhodine 2 B.....	S	A711
Azo Acid Rubine (V.M.).....	K	163	Azo Rubine.....	Sch	163
Azo Acid Rubine 2 B.....	Var.	168	Azo Rubine (V.M.).....	C, etc.	163
Azo Acid Violet.....	By	229	Azo Rubine A.....	tM	163
Azo Acid Violet A 2 B, AL.....	By	229	Azo Rubine S.....	GrE	163
Azo Acid Yellow.....	A	141	Azo Rubine SG.....	S	168
Azo Alizarin Black I.....	DH	292	Azo Rubine WB.....	A	163
Azo Alizarin Bordeaux W.....	DH	291	Azo Rubine WB.....	WB	163
Azo Alizarin Brown I.....	By	A152	Azotol C.....	C	239
Azo Archil R.....	A	44	Azo Turkish Red.....	GrE	115
Azo Black O.....	M	A422	Azo Violet.....	By	407
Azo Black Blue B, R.....	GrE	381	Azo Wool Black (V.M.).....	C	A335
Azo Blue.....	By, etc.	377	Azo Wool Blue (V.M.).....	C	61
Azo Bordeaux.....	Sch	112	Azo Wool Violet (V.M.).....	C	A336
Azo Brown V.....	M	160a	Azo Wool Violet 415.....	K	A301
Azo Cardinal G.....	A	50	Azo Yellow.....	K, M	141
Azo Carmine.....	B	673	Azo Yellow.....	Var.	141
Azo Carmine.....	Var	672	Azo Yellow.....	Sch	141
Azo Carmine B.....	B	673	Azo Yellow 3 A, 3 AN.....	tM	141c
Azo Carmine BX.....	B	673	Azo Yellow A 5 W.....	Sch	141
Azo Carmine G.....	B	672	Azo Yellow 3 G.....	tM	141
Azo Carmine GX.....	B	672	Azo Yellow I.....	I	141
Azo Cerise M, 1618.....	K	A389	Azo Yellow 3 Y.....	tM	141c
Azo Chrome Blue R.....	K	164	Azure Blue.....	K	U306
Azo Chrome Blue R.....	K	163b	Azure Blue A, ASI.....	K	U306
Azo Chromine.....	G	84	Azurine B.....	I	520a
Azo Cocaine 2 R.....	A	77	Azure Blue O, VS.....	K	U306
Azo Cochineal.....	By	95	Basic Black TES.....	K	U307
Azo Coralline.....	WD	65	Basic Blue BA.....	AW	U552
Azo Coralline L.....	WD	65	Basic Blue R.....	DH	677
Azo Corinth.....	GrE	481	Basic Gray.....	Q	U788
Azo Crimson L.....		65	Basic Green Z.....	B	499
Azo Crimson S.....	By	A153	Basic Kraft Brown Y 2.....	B	U100
Azo Eosine.....	By, etc.	94	Basic Violet.....	Q	U789
Azo Fast Blue (V.M.).....	C	A329	Benzamine Azo Blue G.....	WD	337
Azo Fast Violet.....	C	A332	Benzamine Brown 3 G.....	WD	476a
Azo Flavine CX.....	B	141a	Benzamine Brown 3 GO.....	WD	476
Azo Flavine FF, 3 G.....	B	141a	Benzamine Pure Blue.....	WD	426
Azo Flavine GX, 3 R.....	B	141a	Benzamine Violet G.....	WD	326
Azo Flavine 3 R.....	tM	140	Benzydine Pure.....	M	318
Azo Flavine 2 RNH, RX.....	B	141a	Benidine Black.....	C	U275
Azo Flavine RS.....	B	140	Benidine Blue.....	C	U276
Azo Flavine S.....	B	141	Benzo Azo Red B.....	WD	A526
Azo Flavine SGR.....	B	141a	Benzoazurine (V.M.).....	K	410
Azo Fuchsine B.....	By	71	Benzoazurine G.....	A, etc.	410
Azo Fuchsine 6 B.....	By	147	Benzoazurine G.....	By, CG	410
Azo Fuchsine G, 4 G.....	By	146	Benzoazurine G.....	S, etc.	410



Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Bismarck Brown YS.....	tM	283	Brilliant Acid Blue A.....	A, By	545
Bismarck Brown 53.....	Sch	284	Brilliant Acid Blue B, FF, L	By	545c
Bismarck Brown 1568.....	CV	283	Brilliant Acid Blue V.....	By	543
Black (V.M.).....	CJ	U494	Brilliant Acid Blue 25601...	S	545c
Black (V.M.).....	H	U749	Brilliant Acid Carmine B,		
Black AJ.....	P	700a	BOO.....	GrE	66b
Black BH.....	AW	U553	Brilliant Acid Green 6 B...	By	503
Black CBR.....	P	698	Brilliant Acid Red G.....	K	U312
Black CE.....	H	U749	Brilliant Alizarin Blue.....	Var	667
Black C 2 N.....	P	698	Brilliant Alizarin Blue D 3 G	M	667
Black DX.....	H	U749	Brilliant Alizarin Blue D 6 G	M	667
Black E.....	B	U101	Brilliant Alizarin Blue DRI.	M	667
Black HB.....	AW	U554	Brilliant Alizarin Blue R. &		
Black M.....	H	U749	(V.M.).....	By	667
Black N.....	H	U749	Brilliant Alizarin Blue R.....	CR	667
Black NSA.....	P	700a	Brilliant Alizarin Blue 3 R.....	By	667
Black RW, X.....	H	U749	Brilliant Alizarin Green.....	WD	657a
Black soluble in fats.....	G	U605	Brilliant Anthrazurol.....	B	U105
Black soluble in oil.....	C	U277	Brilliant Archil C.....	C	55
Black Base BB.....	B	U102	Brilliant Azo Acid Blue 3 G	S	63b
Black Base S.....	B	U103	Brilliant Azure Blue VS.....	K	U313
Black Black O.....	M	U428	Brilliant Azurine B, R, 5 R.	By	416a
Blue (V.M.).....	H	U750	Brilliant Azurine 5 G.....	By, A, L	416
Blue AS.....	S	U695	Brilliant Benzo Blue 6 B.....	By	424
Blue 3 BB.....	GrE	U502	Brilliant Benzo Green B.....	By	A207
Blue BS.....	P	539	Brilliant Benzo Violet B.....	By	A208
Blue 5 BS.....	tM	U524	Brilliant Benzo Violet 2 R.....	By	A209
Blue BS 3 BB.....	GrE	U503	Brilliant Benzo Fast Violet		
Blue BSJ.....	GrE	U504	2 RL.....	By	A206
Blue BSR.....	GrE	U505	Brilliant Benzo Fast Violet		
Blue CA.....	I	U653	BL.....	By	A206a
Blue CV.....	AW	U555	Brilliant Black.....	Var	272
Blue DB.....	Q	U790	Brilliant Black B.....	B, etc.	272
Blue DR.....	Q	U791	Brilliant Black 3 B, G.....	B	272
Blue DS.....	H	U750	Brilliant Blue A.....	CV	U725
Blue JB.....	C	U278	Brilliant Blue G.....	S	U690
Blue N.....	S	U696	Brilliant Blue GG.....	CV	U726
Blue PCN.....	DH	697	Brilliant Blue 217.....	Q	U794
Blue PCV.....	G	U606	Brilliant Blue 280.....	A	1
Blue RR.....	GrE	U506	Brilliant Bordeaux SD.....	Q	U794
Blue 3 R.....	tM	U525	Brilliant Brown 205.....	A	U795
Blue RS.....	P	537b	Brilliant Carmine CI.....	B	U106
Blue 25.....	S	U697	Brilliant Carmine GG.....	B	U107
Blue 26.....	S	U698	Brilliant Carmine L.....	B	U108
Blue 214.....	B	U104	Brilliant Chrome Blue P.....	S	626
Blue 1900 TC.....	DH	635	Brilliant Chrome Violet BD	By	549a
Blue 16519.....	L	U514	Brilliant Cloth Blue.....	K	189a
Blue 27071.....	By	U217	Brilliant Cochineal 2 R.....	C	81
Blue for silk RN.....	P	537b	Brilliant Congo G.....	A, L	316
Blue (greenish) spirit soluble	M	521	Brilliant Congo R.....	A, L	370
Blue Black B.....	M	269b	Brilliant Congo R.....	By	370
Blue Black N.....	K	215	Brilliant Congo R.....	S	370
Blue Black O.....	M	269b	Brilliant Congo Blue B.....	A	U73
Blue Black for Half Wool G	By	U218	Brilliant Congo Blue 5 R.....	A	U74
Blue Crystals 3035.....	K	U309	Brilliant Congo Violet R.....	A	U75
Blue Residue BW 6 M.....	K	U310	Brilliant Copper Blue BW.....	A	U76
Boma Black BH.....	AW	U556	Brilliant Copper Blue GW.....	A	U77
Boma Black BHX.....	AW	U557	Brilliant Cotton Blue N.....	By	538
Boma Pink.....	AW	U558	Brilliant Croceine (V.M.).....	C	227
Boma Yellow BBF.....	AW	U559	Brilliant Croceine 3 B, MOO	By	227
Bordeaux.....	AW	168	Brilliant Croceine 9 B.....	C	270
Bordeaux extra.....	Sch	320	Brilliant Croceine 3 BA.....	By	227
Bordeaux B.....	Var	112	Brilliant Croceine MD.....	GrE	227
Bordeaux BLA.....	tM	320	Brilliant Croceine NZ.....	M	227
Bordeaux BR.....	BK	112	Brilliant Crimson.....	M	163
Bordeaux BX.....	By	237	Brilliant Crimson N.....	M	163
Bordeaux COV.....	A	320	Brilliant Delphine Blue B.....	K	U314
Bordeaux G.....	By, M	254	Brilliant Delphine Blue BS,		
Bordeaux G.....	BK	112	VS.....	S	622
Bordeaux R.....	BK, K	112	Brilliant Dianil Blue 6 G.....	M	541
Bordeaux S.....	A	168	Brilliant Dianol Red R.....	I, W	358
Bordeaux 5005.....	BK	112	Brilliant Diazine Blue 1230.	K	U315
Bordeaux Black.....	Q	U792	Brilliant Double Scarlet.....	BK	176b

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
azurine 3 G.....	By, etc.	411	Benzoflavine O.....	GrF	605
azurine R.....	By	410	Benzofarm Blue B.....	By	A196
azurine 3 R.....	GrE	385	Benzofarm Brown R.....	By	A197
azurine WB.....	WB	410	Benzofarm Orange G.....	A	U71
Black Blue G.....	By	459	Benzofarm Orange G.....	By	A198
Black Blue 5 G.....	By	460	Benzofarm Red G.....	A	U72
Black Blue R.....	By	450	Benzofarm Red G.....	By	A199
Blue 2 B.....	By	337	Benzofarm Red 2 GF.....	By	A200
Blue 3 B.....	By	391	Benzofarm Scarlet B.....	By	A201
Blue BX.....	By	386	Benzofarm Yellow R.....	By	A202
Blue RW.....	By	419	Benzo Gray S.....	By	447
Bordeaux 6 B.....	By	A154	Benzo Green BB.....	By	A184
Brilliant Blue 2 GDN	BK	A442	Benzo Green C.....	By	A185
Bronze E.....	By	A155	Benzo Green FF.....	By	A186
Bronze GC.....	By	A156	Benzo Green FFG.....	By	A187
Brown B.....	By	487	Benzo Green G.....	By	A188
Brown BX.....	By	490	Benzo Blue 5 GN, RH.....	BK	410
Brown D 3 G.....	By	485a	Benzo Brilliant Blue GDN	BK	410
Brown G.....	By	485	Benzo Brown C.....	BK	477
Brown 5 G, 2 GC, 3 GC	By	435a	Benzo Fast Red AE.....	BK	194
Brown MC, NBX.....	By	435a	Benzo Indigo Blue.....	By	452
Brown 5 R.....	By	190	Benzo New Blue 2 B.....	By	379
Brown RC, TR.....	By	485a	Benzo New Blue 5 B.....	By	379
Chrome Black Blue B	By	A157	Benzo New Red 4 B.....	By	A189
Chrome Brown B.....	By	A158	Benzo Olive.....	By	446
Chrome Brown BS.....	By	A159	Benzo Orange R.....	By	340
Chrome Brown G.....	By	A160	Benzo Pure Yellow FF.....	By	A190
Chrome Brown 5 G.....	By	A161	Benzopurpurin.....	AW	365a
Chrome Brown R.....	By	A162	Benzopurpurin.....	H	365
Copper Blue B.....	By	A163	Benzopurpurin.....	I	365a
Copper Blue 2 B.....	By	A164	Benzopurpurin AM.....	By	365a
Cyanine B.....	By	390	Benzopurpurin B.....	A, etc.	365
Cyanine 3 B.....	By	425	Benzopurpurin 4 B.....	A, etc.	363
Cyanine R.....	By	336	Benzopurpurin 6 B.....	By, etc.	364
Dark Brown.....	By	A165	Benzopurpurin 10 B.....	A, etc.	405
Dark Green B.....	By	A166	Benzopurpurin 4 BM.....	A	363
Dark Green GG.....	By	A167	Benzopurpurin 4 BN.....	BK	363
Deep Black SS.....	By	A168	Benzopurpurin 4 BP.....	GrE	363
Fast Black.....	G	A611	Benzopurpurin 4 BX.....	Q	363
Fast Black L.....	By	A169	Benzo Red 10 B.....	By	A191
Fast Blue B, BN.....	By	456	Benzo Red 12 B.....	By	A192
Fast Blue FRL, 2 GL	By	456a	Benzo Rhoduline Red B.....	By	A203
Fast Blue 4 GL, 2 L	By	456a	Benzo Rhoduline Red 3 B.....	By	A204
Fast Blue R.....	A	451	Benzo Rubine HW.....	By	A193
Fast Bordeaux 6 BL	By	A170	Benzo Rubine SC.....	By	A194
Fast Brown 3 GL.....	By	A171	Benzo Scarlet.....	By	319
Fast Brown RL.....	By	A172	Benzo Scarlet BC.....	By	A195
Fast Eosine BL.....	By	A173	Benzo Sky Blue.....	By	426
Fast Gray.....	By	A174	Benzo Violet.....	CR	517
Fast Gray BL.....	By	A175	Benzo Violet O.....	By	326
Fast Heliotrope BL.....	By	A176	Benzo Violet R.....	By	326a
Fast Heliotrope 4 BL	By	A177	Benzoyl Pink.....	P	104
Fast Heliotrope 5 RH	By	A178	Benzyl Black B.....	I	A661
Fast Heliotrope 2 RL	By	A179	Benzyl Blue B.....	I	U651
Fast Orange 2 RL.....	By	A180	Benzyl Bordeaux B, 17619.....	I	U652
Fast Orange S.....	By	A181	Benzyl Green B.....	I	503
Fast Orange WS.....	By	340a	Benzyl Red.....	I	A662
Fast Pink 2 BL.....	By	297	Benzyl Violet.....	I	517
Fast Red.....	By	332	Benzyl Violet 4 B, 6 B, 10 B	I	517
Fast Red 8 BL, 9 BL, D	By	332	Benzyl Violet 5 BN.....	I	517
Fast Red FC.....	By	343	Betamine Blue 8 B.....	...	541
Fast Red GL, L.....	By	332	Biebrich Acid Blue G.....	K	U308
Fast Rubine BL.....	By	A183	Biebrich Acid Blue V.....	K	U309
Fast Scarlet (V.M.).....	By	279	Biebrich Acid Violet R.....	K	A392
Fast Scarlet 4BS, 5BS	By	279	Biebrich Patent Black.....	K	278
Fast Scarlet 8 BS, SN.....	By	279	Bismarck Acid Brown.....	By	A205
Fast Scarlet GS.....	By	279	Bismarck Brown.....	A, etc.	283
Fast Violet NC.....	By	327	Bismarck Brown (V.M.).....	C	283
Fast Violet R.....	By	327a	Bismarck Brown EL.....	A	283
Fast Yellow 4 GL.....	By	296a	Bismarck Brown G.....	I	283
Fast Yellow 5 GL.....	By	296	Bismarck Brown R.....	CV, etc.	284
Fast Yellow RL.....	By	296a	Bismarck Brown 2 R, 2 RV	tM	284
			Bismarck Brown Y.....	Sch	283

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Bismarck Brown YS.....	tM	283	Brilliant Acid Blue A.....	A, By	545
Bismarck Brown 53.....	Sch	284	Brilliant Acid Blue B, FF, L	By	545c
Bismarck Brown 1568.....	CV	283	Brilliant Acid Blue V.....	By	543
Black (V.M.).....	CJ	U494	Brilliant Acid Blue 25601...	S	545c
Black (V.M.).....	H	U749	Brilliant Acid Carmine B,		
Black AJ.....	P	700a	BOO.....	GrE	66b
Black BH.....	AW	U553	Brilliant Acid Green 6 B...	By	503
Black CBR.....	P	698	Brilliant Acid Red G.....	K	U312
Black CE.....	H	U749	Brilliant Alizarin Blue...	Var	667
Black C 2 N.....	P	698	Brilliant Alizarin Blue D 3 G	M	667
Black DX.....	H	U749	Brilliant Alizarin Blue D 6 G	M	667
Black E.....	B	U101	Brilliant Alizarin Blue DRI.	M	667
Black HB.....	AW	U554	Brilliant Alizarin Blue R. &		
Black M.....	H	U749	(V.M.).....	By	667
Black N.....	H	U749	Brilliant Alizarin Blue R...	CR	667
Black NSA.....	P	700a	Brilliant Alizarin Blue 3 R...	By	667
Black RW, X.....	H	U749	Brilliant Alizarin Green...	WD	657a
Black soluble in fats.....	G	U605	Brilliant Anthrazuril.....	B	U105
Black soluble in oil.....	C	U277	Brilliant Archil C.....	C	55
Black Base BB.....	B	U102	Brilliant Azo Acid Blue 3 G	S	63b
Black Base S.....	B	U103	Brilliant Azure Blue VS.....	K	U313
Black Black O.....	M	U428	Brilliant Azurine B, R, 5 R.	By	416a
Blue (V.M.).....	H	U750	Brilliant Azurine 5 G.....	By, A, L	416
Blue AS.....	S	U695	Brilliant Benzo Blue 6 B...	By	424
Blue 3 BB.....	GrE	U502	Brilliant Benzo Green B...	By	A207
Blue BS.....	P	539	Brilliant Benzo Violet B...	By	A208
Blue 5 BS.....	tM	U524	Brilliant Benzo Violet 2 R...	By	A209
Blue BS 3 BB.....	GrE	U503	Brilliant Benzo Fast Violet		
Blue BSJ.....	GrE	U504	2 RL.....	By	A206
Blue BSR.....	GrE	U505	Brilliant Benzo Fast Violet		
Blue CA.....	I	U653	BL.....	By	A206a
Blue CV.....	AW	U555	Brilliant Black.....	Var	272
Blue DB.....	Q	U790	Brilliant Black B.....	B, etc.	272
Blue DR.....	Q	U791	Brilliant Black 3 B, G.....	B	272
Blue DS.....	H	U750	Brilliant Blue A.....	CV	U725
Blue JB.....	C	U278	Brilliant Blue G.....	S	U699
Blue N.....	S	U696	Brilliant Blue GG.....	CV	U726
Blue PCN.....	DH	697	Brilliant Blue 217.....	Q	U703
Blue PCV.....	G	U606	Brilliant Blue 286.....	Q	U794
Blue RR.....	GrE	U506	Brilliant Bordeaux SD.....	A	41
Blue 3 R.....	tM	U525	Brilliant Brown 205.....	Q	U795
Blue RS.....	P	537b	Brilliant Carmine CL.....	B	U106
Blue 25.....	S	U697	Brilliant Carmine GG.....	B	U107
Blue 26.....	S	U698	Brilliant Carmine L.....	B	U108
Blue 214.....	B	U104	Brilliant Chrome Blue P.....	S	626
Blue 1900 TC.....	DH	635	Brilliant Chrome Violet BD	By	549a
Blue 16519.....	L	U514	Brilliant Cloth Blue.....	K	189a
Blue 27071.....	By	U217	Brilliant Cochineal 2 R.....	C	81
Blue for silk RN.....	P	537b	Brilliant Congo G.....	A, L	316
Blue (greenish) spirit soluble	M	521	Brilliant Congo R.....	A, L	370
Blue Black B.....	M	269b	Brilliant Congo R.....	By	370
Blue Black N.....	K	215	Brilliant Congo R.....	S	370
Blue Black O.....	M	269b	Brilliant Congo Blue B.....	A	U73
Blue Black for Half Wool G	By	U218	Brilliant Congo Blue 5 R...	A	U74
Blue Crystals 3035.....	K	U309	Brilliant Congo Violet R...	A	U75
Blue Residue BW 6 M.....	K	U310	Brilliant Copper Blue BW...	A	U76
Boma Black BH.....	AW	U556	Brilliant Copper Blue GW...	A	U77
Boma Black BHX.....	AW	U557	Brilliant Cotton Blue N.....	By	538
Boma Pink.....	AW	U558	Brilliant Croceine (V.M.)...	C	227
Boma Yellow BBF.....	AW	U559	Brilliant Croceine 3 B, MOO	By	227
Bordeaux.....	AW	168	Brilliant Croceine 9 B.....	C	270
Bordeaux extra.....	Sch	320	Brilliant Croceine 3 BA.....	By	270
Bordeaux B.....	Var	112	Brilliant Croceine MD.....	GrE	227
Bordeaux BLA.....	tM	320	Brilliant Croceine NZ.....	M	227
Bordeaux BR.....	BK	112	Brilliant Crimson.....	M	163
Bordeaux BX.....	By	237	Brilliant Crimson N.....	M	163
Bordeaux COV.....	A	320	Brilliant Delphine Blue B...	K	U314
Bordeaux G.....	By, M	254	Brilliant Delphine Blue BS,		
Bordeaux G.....	BK	112	VS.....	S	622
Bordeaux R.....	BK, K	112	Brilliant Dianil Blue 6 G...	M	541
Bordeaux S.....	A	168	Brilliant Dianil Red R.....	I, W	358
Bordeaux 5005.....	BK	112	Brilliant Diazine Blue 1230.	K	U315
Bordeaux Black.....	Q	U792	Brilliant Double Scarlet....	BK	176b

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
nt Fast Black. ....	I	U654	Brilliant Yellow S. ....	B, etc.	142
nt Fast Blue. ....	AW	A539	Bromofluoresceic Acid A 3 G	M	587b
nt Fast Blue B. ....	By	A210	Bromofluoresceic Acid BA,		
nt Fast Blue 3 BX. ....	By	A211	BL. ....	M	587b
nt Fast Blue 2 G. ....	By	A212	Bromofluoresceic Acid Crys-		
nt Fast Blue 4 G. ....	By	A213	tals. ....	M	587b
nt Fast Red G. ....	B	162	Bromo Indigo FB. ....	By	881
nt Fast Red P. ....	By	A214	Bromo Indigo Rathjen. ....	...	879
nt Geranine B. ....	By	118	Bromo Metanil Yellow. ....	P	135
nt Glacier Blue. ....	I	501	Brown. ....	BK	U479
nt Green. ....	Var	499	Brown A 1678. ....	B	U111
nt Green B. ....	tM	495	Brown GC. ....	G	U607
nt Green 6 B. ....		499	Brown PCC. ....	DH	U596
nt Green BN. ....	tM	499	Brown Y. ....	H	283
nt Green D. ....	C	499	Brown PCC. ....	G	U607
nt Green PND. ....	GrE	499	Brown 43. ....	S	U700
nt Green S. ....	CJ	499	Brown 359. ....	Lev	283b
nt Hessian Purple. ....	L	302	Brown 37104. ....	H	283
nt Indigo B. ....	B	885	Buffalo Black AD. ....	Sch	266
nt Indigo BD. ....	B	885	Buffalo Black 2 B. ....	Sch	272
nt Indigo 2 B, BBD. ....	B	884	Buffalo Black 4 B. ....	Sch	269
nt Indigo 4 G. ....	B	887	Buffalo Black 8 B, 10 B. ....	Sch	261
nt Indigo G, GD, ....			Buffalo Black EA. ....	Sch	268
D. ....	B	886	Buffalo Black NB. ....	Sch	217
nt Lake Red R. ....	M	45	Buffalo Black PY. ....	Sch	220
nt Lanafuchsine ....			Buffalo Black R. ....	Sch	261
(T.). ....	C	U280	Buffalo Chrome Black BWN	Sch	275
nt Milling Blue (V.M.).	C	U281	Buffalo Cyanine R, 3 R. ....	Sch	257
nt Milling Blue B. ....	K	U316	Buffalo Direct Blue G. ....	Sch	410
nt Milling Green B. ....	C	503	Buffalo Direct Cardinal 7 B	Sch	405
nt Naphthol Blue. ....	C	U282	Buffalo Direct Crimson B. ....	Sch	313
nt Orange G. ....	A, By	339	Buffalo Direct Garnet R. ....	Sch	312
nt Orange O. ....	M	70	Buffalo Direct Orange R. ....	Sch	362
nt Orange R. ....	M, etc.	79	Buffalo Direct Orange Y. ....	Sch	392
nt Orseille. ....	C	55	Buffalo Direct Red 4 B. ....	Sch	363
nt Orseille C. ....	C	55	Buffalo Direct Violet 4 R. ....	Sch	375
nt Patent Blue A. ....	K	U317	Buffalo Direct Yellow CG. ....	Sch	342
nt Patent Blue A. ....	M	545	Buffalo Direct Yellow CRR	Sch	394
nt Phosphine. ....	I	606b	Buffalo Fast Blue B. ....	Sch	189
nt Phosphine G, 5 G. ....	I	606	Buffalo Fast Blue R. ....	Sch	188
nt Pink. ....	S	571a	Buffalo Fast Crimson G. ....	Sch	64
nt Ponceau 5 R. ....	By	169	Buffalo Fast Crimson R. ....	Sch	66
nt Pure Yellow 6 G. ....	By	U219	Buffalo Fast Fuchsine B. ....	Sch	147
nt Purpurin 4 B. ....	A, By	368	Buffalo Flamine B. ....	Sch	94
nt Purpurin 10 B. ....	A	368a	Buffalo Flamine G. ....	Sch	95
nt Purpurin R. ....	A, etc.	369	Buffalo Rubine. ....	Sch	110
nt Red R paste. ....	...	45	Butter Yellow. ....	A, etc.	32
nt Rhodulin Red B. ....	By	684b	Cachou (V.M.). ....	Lev	U731
nt Rhodulin Violet. ....	By	684a	Cachou de Laval. ....	P	706
nt Safranin G. ....	A	679	Calcutta Black D. ....	H	U751
nt Safranin R. ....	Sch	684	Calcutta Blue. ....	S	626
nt Scarlet (V.M.). ....	C	U283	Calcutta Blue 2. ....	*S	U701
nt Scarlet AL. ....	M	A424	Caledon Blue R. ....	...	842
nt Scarlet NY 47. ....	B	U109	Caledon Green. ....	...	765
nt Scarlet R. ....	BK	A443	Caledon Purple. ....	...	763
nt Scarlet 2 R. ....	tM	A515	Caledon Violet. ....	K	766
nt Scarlet 3 R. ....	Sch	160	Candle Blue. ....	K	U318
nt Scarlet 4 R, 4 RSP	tM	A516	Candle Violet. ....	K	U319
nt Scarlet 141113. ....	B	U110	Canella AL. ....	B	606
nt Sky Blue 5 B. ....	By	U220	Capri Blue GON. ....	By, L	620
nt Sky Blue 6 B. ....	...	424	Capri Green BN. ....	I	620a
nt Sky Blue G. ....	By	U221	Carbazole Wool Green. ....	C	U284
nt Sky Blue 5 G. ....	By	541	Carbide Black. ....	I	462f
nt Sky Blue 8 G. ....	By	U223	Carbide Black E, EX, SX. ....	I	462f
nt Sulfonazurine R. ....	By	361a	Carbide Fast Black GF. ....	I	462f
nt Sulfon Red B, 5 B, ....			Carbide Violet V. ....	I	462g
S. ....	S	182	Carbindol Blue R. ....	...	748
nt Victoria Blue RB. ....	I	559b	Carbon Black (V. M.). ....	K	458
nt Wool Blue B, FFR, G	By	562a	Carbon Black 4 B. ....	M	272
nt Yellow. ....	By	U224	Cardinal 3 B. ....	H	512
nt Yellow. ....	Var.	303	Cardinal Red J. ....	H	161
nt Yellow. ....	tM	142	Carmina Blue A. ....	AW	U560
nt Yellow C. ....	Sch	303	Carmine special. ....	P	U592

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Carmine Blue V.....	K	U320	Chloramine Yellow GG,		
Carmine Brilliant Blue.....	AW	U561	HW, M.....	By	617
Carmine Naphth Garnet.....	DH	106	Chloramine Yellow M.....	S	617
Carmoisine.....	A, S	163	Chloramine Yellow RC.....	By	617
Carmoisine B.....	By	163	Chloranisidine Scarlet.....	M	97
Carmoisine 3 B.....	By	163a	Chloranthrene Yellow G.....	...	849
Carmoisine 6 B, R.....	H	163a	Chlorantine Blue BB.....	I	A663
Carmoisine L, WS.....	...	163	Chlorantine Brown BB.....	I	A664
Carpet Red B, BT, R.....	K	U321	Chlorantine Brown R.....	I	A665
Carthamine 6 A, B.....	tM	573a	Chlorantine Brown 15521.....	I	A666
Cashmere Black 3 BN.....	By	A215	Chlorantine Brown 15895.....	I	A667
Cashmere Black MCS.....	H	A733	Chlorantine Fast Blue RL.....	I	451
Cashmere Black V.....	By	A216	Chlorantine Lilac B.....	I	A668
Cashmere Blue TG.....	By	A217	Chlorantine Lilac BB.....	I	A669
Celestial Blue.....	WD	U541	Chlorantine Orange TR.....	I	A670
Celestine Blue B.....	By	641	Chlorantine Orange 11323.....	I	A671
Cerarine Brown AN.....	C	U285	Chlorantine Pure Blue.....	I	A672
Cerarine Dark Red I, II.....	C	223a	Chlorantine Red.....	I	358
Cerarine Orange G.....	C	35	Chlorantine Violet BB.....	I	A673
Cerarine Red 56 I, 56 II.....	C	223	Chlorantine Yellow JJ.....	I	617
Ceres Blue 4.....	By	U225	Chlorazol Blue GBDS.....	H	417
Ceres Brown 3.....	By	U226	Chlorazol Blue 3 G.....	H	417
Ceres Brown 4.....	By	U227	Chlorazol Blue R.....	H	417
Ceres Orange 3.....	By	U228	Chlorazol Brilliant Blue 3 B,		
Ceres Red 3.....	By	U229	10 B.....	H	417a
Ceres Red 6.....	By	U230	Chlorazol Brilliant Blue 14 B,		
Cerise DN, DIV.....	B	512	F.....	H	417a
Cerise M.....	tM	512	Chlorazol Brilliant Bordeaux		
Cerise N.....	C	512	RH.....	H	A734
Ceroflavine.....	B	U112	Chlorazol Brilliant Green G.....	H	A738
Cerotine Scarlet G.....	CJ	34b	Chlorazol Brown G.....	H	A735
Chicago Blue B.....	A	423	Chlorazol Brown M.....	H	A736
Chicago Blue 4 B.....	A	422	Chlorazol Brown MAS.....	H	A737
Chicago Blue 6 B.....	A	424	Chlorazol Catechine B.....	H	A739
Chicago Blue R.....	A, By	388	Chlorazol Drab RH.....	H	A740
Chicago Blue 2 R.....	A	384	Chlorazol Fast Blue RH.....	H	A741
Chicago Blue 4 R.....	A	324	Chlorazol Fast Bordeaux B.....	H	A742
Chicago Blue RW.....	A	419	Chlorazol Fast Red 10 B.....	H	A743
Chicago Blue new.....	A	422a	Chlorazol Fast Scarlet RH.....	H	A744
Chicago Orange G.....	G	15	Chlorazol Fast Yellow A.....	H	A745
Chicago Red 111.....	G	A612	Chlorazol Fast Yellow AF.....	H	A746
China Blue.....	A	539	Chlorazol Fast Yellow AG.....	H	A747
Chinaldine Yellow.....	...	613	Chlorazol Fast Yellow BS.....	H	A748
Chloramine Black BH.....	S	469	Chlorazol Fast Yellow R.....	H	A749
Chloramine Black BH.....	S	333	Chlorazol Green B.....	H	474
Chloramine Black EXD, FF.....	S	469a	Chlorazol Green G.....	H	A750
Chloramine Black HW.....	S	473	Chlorazol Orange 2 R.....	H	340
Chloramine Black N.....	S	469	Chlorazol Red A.....	H	A751
Chloramine Blue 2 B.....	S	337	Chlorazol Sky Blue FF.....	H	A752
Chloramine Blue 3 B.....	S	471a	Chlorazol Sky Blue FFS.....	H	A753
Chloramine Blue 3 G.....	S	471	Chlorazol Violet B.....	H	A754
Chloramine Blue BXR.....	S	386	Chlorazol Violet 3 B.....	H	A755
Chloramine Blue HW.....	S	472	Chlorazol Violet R.....	H	A756
Chloramine Brilliant Red 8 B.....	S	358	Chlorophenine.....	ClCo	17
Chloramine Brown G.....	By	A218	Chocolate Brown.....	AW	U568
Chloramine Dark Green B.....	S	470a	Chocolate Brown G.....	B	U113
Chloramine Fast Red F, FF.....	S	343	Chocolate Brown R.....	B	U114
Chloramine Fast Yellow B.....	By	617	Chromal Blue G, GC.....	G	552
Chloramine Green B.....	S	470	Chromal Dark Blue K.....	G	552a
Chloramine Green G.....	S	475	Chromal Fast Brown G.....	G	U608
Chloramine Orange.....	S	11	Chromal Fast Brown R.....	G	U609
Chloramine Orange G.....	By	11	Chromanil Black BF.....	A	A2
Chloramine Pure Blue.....	S	471b	Chromanil Black FF.....	A	A3
Chloramine Red B, 3 B.....	S	319	Chromanil Blue R.....	A	A4
Chloramine Red 8 B, 8 BS.....	By	358	Chromanil Brown 2 G.....	A	A5
Chloramine Sky Blue Aeone.....	S	426	Chromazine Blue G.....	M	U429
Chloramine Sky Blue 6 B, FF.....	S	424	Chromazone Blue R.....	G	130
Chloramine Violet.....	By	A220	Chromazone Red (new), A.....	G	129
Chloramine Violet N.....	S	327	Chrome Acid Black.....	I	U655
Chloramine Violet R.....	By	A221	Chrome Acid Black RSI.....	I	U656
Chloramine Yellow.....	By, etc.	617	Chrome Azurol S.....	G	554
Chloramine Yellow DB, FF.....	By	617	Chrome Black.....	WD	275a
Chloramine Yellow G.....	S	617	Chrome Black BA.....	Q	A765

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Black A.....	CG	275a	Chrome Fast Yellow R, 2 R	A	177
Black DF.....	AW	275a	Chrome Gallus Brown RR..	G	158a
Black DF.....	M	A425	Chrome Green.....	By	509
Black FPP, G.....	AW	275a	Chrome Green (V. M.).....	K	U324
Black I.....	H	275a	Chrome Green C.....	K	U324
Black LV.....	K	U322	Chrome Green G.....	L	U515
Black M, Z.....	H	275a	Chrome Heliotrope.....	DH	625
Black 2841.....	K	U322	Chrome Leather Black E.....	B	U116
Black 57006.....	H	275a	Chrome Leather Black E.....	By	U233
Blue.....	By	567	Chrome Leather Black E.....	S	U702
Blue ATX.....	B	163b	Chrome Leather Black EA.....	B	U117
Blue B.....	WB	626	Chrome Leather Black I.....	WD	U542
Blue 2 B, FBX.....	BK	163b	Chrome Leather Black M.....	By	U234
Blue G.....	Q	163b	Chrome Leather Brown R.....	S	U703
Blue R.....	AW	163	Chrome Orange GR.....	By	U235
Blue R.....	WB	599	Chrome Patent Green N.....	K	219
Blue RX.....	B	163b	Chrome Red 2593.....	K	U325
Blue Black B.....	K	U323	Chrome Violet.....	By	549
Bordeaux.....	By	550	Chrome Violet.....	G	557
Brown.....	AW	158a	Chrome Violet Brown 9457.....	K	U326
Brown CS.....	K	158a	Chrome Violet S for print- ing.....	G	557
Brown F.....	P	90	Chrome Yellow.....	By	177
Brown RR.....	G	158	Chrome Yellow.....	I	177c
Brown RVV.....	G	158	Chrome Yellow D, DF.....	By	177
Brown 414.....	Lev	158a	Chrome Yellow G, GG.....	S	177c
Brown 2813.....	K	158a	Chrome Yellow R.....	AW	177c
Deep Black A.....	G	275b	Chrome Yellow R.....	By	177
Deep Black A.....	tM	275	Chrome Yellow SM, 2501.....	K	A393
Deep Black G.....	G	275b	Chromine G.....	S	614
Deep Black G.....	tM	275	Chromine RR.....	S	614a
Fast Black.....	G	275	Chromine Blue.....	A	U562
Fast Black A.....	CG	181c	Chromine Blue B.....	AW	U563
Fast Black B.....	I	275c	Chromine Brown R.....	AW	U564
Fast Black F.....	A	A6	Chromine Brown V.....	AW	U565
Fast Black F.....	...	275	Chromine Fast Blue S.....	AW	U566
Fast Black FW.....	I	275c	Chromine Violet 2 R.....	AW	U567
Fast Black P4B.....	A	A7	Chromocitronine R.....	DH	140a
Fast Black PF.....	A	A8	Chromocyanine B, V.....	DH	631
Fast Black PON.....	CG	181c	Chromogene I.....	M	777
Fast Black PT.....	A	A9	Chromogene Violet B.....	M	U430
Fast Black PV.....	...	157	Chromopurpurin II.....	DH	U597
Fast Black PWBL.....	I	181	Chromotrope 2 B.....	M	57
Fast Black PWRL.....	I	181	Chromotrope 6 B.....	M	67
Fast Black 12172.....	CG	181c	Chromotrope 8 B.....	M	171
Fast Blue B.....	B	U115	Chromotrope 10 B.....	M	114
Fast Blue 4 B.....	A	U78	Chromotrope DW.....	M	57a
Fast Blue R.....	I	U657	Chromotrope F 4 B.....	M	164
Fast Blue 13366.....	I	U658	Chromotrope 2 R.....	M	40
Fast Brown A.....	I	A674	Chromotrope S.....	M	57a
Fast Brown BC.....	I	A675	Chromoxane Blue R.....	By	U236
Fast Brown G.....	I	A676	Chromoxane Violet 5 B.....	By	U237
Fast Brown R.....	A	A10	Chrysamine G.....	By, etc.	342
Fast Brown TP.....	By	U231	Chrysamine K.....	A	342
Fast Brown TV.....	I	A679	Chrysamine R.....	By, I	394
Fast Brown V.....	I	A678	Chrysobarine.....	tM	304c
Fast Brown 12084.....	I	A678	Chrysobarine R.....	tM	304c
Fast Brown 15823.....	I	A680	Chrysoidine.....	Var	33
Fast Cyanine G.....	I	A681	Chrysoidine A.....	B	33
Fast Garnet BL.....	A	U79	Chrysoidine AL.....	tM	34
Fast Green G.....	I	A682	Chrysoidine C 2 E.....	P	33
Fast Green GL.....	I	A683	Chrysoidine E.....	B	33
Fast Green 10394.....	I	A684	Chrysoidine GS.....	I	33
Fast Orange R.....	I	A685	Chrysoidine 3 N.....	tM	33
Fast Orange RD.....	By	U232	Chrysoidine R.....	Var	34
Fast Pure Blue BX.....	I	551	Chrysoidine R.....	C, DH	69
Fast Red G.....	A	A11	Chrysoidine 3 R.....	Sch	34
Fast Violet B.....	I	A686	Chrysoidine RD.....	CV	33
Fast Yellow BN.....	CG	177d	Chrysoidine RE.....	P	34
Fast Yellow G.....	A	96a	Chrysoidine RG.....	B	34
Fast Yellow 2 G.....	A	96	Chrysoidine RL, RLE.....	B	34
Fast Yellow GG.....	I	96a	Chrysoidine T base.....	B	34a
Fast Yellow GA, O.....	I	96a	Chrysoidine Y.....	Var	33

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Chrysoidine 2 Y.....	tM	33	Cloth Scarlet 2584.....	K	U327a
Chrysoidine 46803.....	A	33	Cloth Yellow R.....	GrE	A458
Chrysoidine Base.....	K	33	Cocceine Orange.....	P	227a
Chrysoidine crystals.....	Sch	33	Cocaine 2 BG, 3 BG.....	A	167
Chrysoine.....	Var	143	Cocchine B.....	M	101
Chrysolarine A.....	tM	U526	Cochineal.....	P	81b
Chrysoline.....	G, S, P	586	Cochineal Red A.....	B	169
Chrysophenine.....	I, S	304	Cochineal Scarlet B.....	WD	95
Chrysophenine G.....	Var	304	Cochineal Scarlet 4 R.....	Sch	78
Chrysophenine GOO.....	L	304	Cœrulein B.....	M	600
Chrysophenine R, W.....	By	304a	Cœrulein I.....	B	601
Chrysophenine III.....	AW	304	Cœrulein MS powder.....	DH	601
Chrysophenine 190.....	K	304	Cœrulein S.....	B, etc.	601
Ciba Blue B.....	I	880	Cœrulein SL powder.....	BD	601
Ciba Blue 2 B, 2 BD.....	I	881	Cœrulein SW.....	B, By	601
Ciba Blue G, 2 B.....	I	882	Columbia Black.....	A	436
Ciba Bordeaux B.....	I	919	Columbia Black B.....	A	455
Ciba Gray B, G.....	I	899	Columbia Black EA.....	A	455a
Ciba Green G.....	I	891	Columbia Black FF, FB, F2B.....	A	436
Ciba Heliotrope B.....	I	897	Columbia Black R.....	A	453
Cibanone Black B, BG, 2 G.....	I	794	Columbia Black WA.....	A	455a
Cibanone Blue 3 G.....	I	793	Columbia Black Green D.....	A	465
Cibanone Brown B, V.....	I	868	Columbia Blue G, GM.....	A	387
Cibanone Green G.....	I	792a	Columbia Blue R.....	A	325
Cibanone Olive B, G.....	I	792b	Columbia Bordeaux B.....	A	U80
Cibanone Orange R.....	I	792	Columbia Brown M.....	A	A12
Cibanone Yellow R.....	I	795	Columbia Brown R.....	A	A13
Ciba Orange G.....	I	911	Columbia Catechine 3 B.....	A	U81
Ciba Pink R.....	I	910a	Columbia Catechine G.....	A	U82
Ciba Red R.....	I	908	Columbia Catechine O.....	A	U83
Ciba Red B.....	I	909	Columbia Catechine R.....	A	U84
Ciba Red G.....	I	906	Columbia Fast Black D.....	A	U86
Ciba Scarlet G.....	I	907	Columbia Fast Black FF.....	A	U87
Ciba Violet B.....	I	901	Columbia Fast Black G.....	A	U88
Ciba Violet 3 B.....	I	900	Columbia Fast Black V.....	A	U89
Ciba Violet R.....	I	901	Columbia Fast Blue 2 G.....	A	A16
Ciba Yellow G.....	I	890	Columbia Fast Blue R.....	A	A17
Cinnabar Scarlet BF.....	BK	299	Columbia Fast Red F.....	A	343
Cinnabar Scarlet G, R.....	BK	300	Columbia Fast Scarlet 4 B.....	A	279
Citronine GOO.....	L	141	Columbia Green.....	A	478
Citronine GOOO, 2 R0000.....	GrE	140	Columbia Green B, 3 B, G.....	A	478
Claret NY Z 1413.....	B	U118	Columbia Orange R.....	A	A14
Claret Lake BL.....	By	U238	Columbia Violet R.....	A	A15
Claret Red.....	B	U119	Columbia Yellow.....	A	617
Claret Red.....	H	A757	Columbo Blue 4 R.....	I	U663
Claret Red B, BO.....	M	112a	Coomassie Acid Blue R.....	BD	188
Claret Red SS.....	B	U120	Coomassie Black B.....	I ev	433
Claret Red X.....	M	112a	Coomassie Blue Black.....	Lev	217
Clayton Cloth Red.....	ClCo	193	Coomassie Navy Blue.....	Lev	434
Clayton Yellow.....	ClCo	198	Coomassie Navy Blue 2 RNX.....	BD	252
Cloth Blue 1769, 1770.....	K	U327	Coomassie Union Blacks.....	Lev	461
Cloth Fast Black B.....	I	U659	Coomassie Wool Black D.....	Lev	266
Cloth Fast Blue B.....	I	693	Coomassie Wool Black S.....	Lev	244
Cloth Fast Blue GTB.....	I	U661	Coomassie Wool Black R.....	Lev	243
Cloth Fast Blue R.....	I	257	Concentrated Blue BB.....	H	U752
Cloth Fast Red R.....	I	484	Concentrated Cotton Blue		
Cloth Red B.....	By	233	B, 2.....	M	539
Cloth Red B.....	GrE, K	236	Congo.....	A	307
Cloth Red BB.....	K	A394	Congo 4 R.....	A	374
Cloth Red B, 2 B.....	WD	236	Congo Blue 2 B.....	By	412
Cloth Red 3 B.....	By	231	Congo Blue 3 B.....	A	391
Cloth Red BA.....	A	236	Congo Brown.....	Var	477
Cloth Red BC.....	By	223a	Congo Brown G.....	A, Lev	477
Cloth Red BO.....	GrE	236	Congo Brown R.....	A, Lev	490
Cloth Red G.....	By	224	Congo Corinth B.....	Var	375
Cloth Red G.....	By, GrE	234	Congo Corinth G.....	Var	312
Cloth Red GA.....	A	234	Congo Fast Blue B.....	A	456
Cloth Red 3 GA.....	A	230	Congo Fast Blue R.....	A	451
Cloth Red GFL, GL.....	A	234	Congo Magenta.....	K	A395
Cloth Red O.....	M	236	Congo Magenta 3616.....	K	A395
Cloth Red 1769, 2586.....	K	A394	Congo Orange G.....	Var	315
Cloth Scarlet C, G.....	K	246	Congo Orange R.....	A, L	373
Cloth Scarlet R.....	K	252	Congo Orange R, RG.....	By	373

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Congo Red.....	Var	307	Cotton Olive.....	Lev	U734
Congo Red 4 B.....	Sch	307	Cotton Orange.....	K	U333
Congo Red 4 R.....	By	374	Cotton Orange.....	Q	210c
Congo Rubine.....	Var	313	Cotton Orange.....	S	34d
Congo Rubine G.....	S	313	Cotton Orange (V. M.).....	Lev	210a
Congo Rubine BK.....	BK	313	Cotton Orange FB, GK.....	K	U333
Congo Rubine 8714.....	CG	313	Cotton Orange G.....	B, S	192
Coreine AR, AB.....	DH	646	Cotton Orange R.....	B	210
Coreine 2 R.....	DH	641	Cotton Orange RR, R 2 O.....	K	U333
Corioflavine G, GG, GOOO, R	GrE	609o	Cotton Orange 16737.....	I	34c
Coriphosphine OS, OX.....	By	606c	Cotton Orange Brown (V. M.).....	Lev	210b
Corvan Black BG.....	B	A69	Cotton Pink B.....	B	U125
Corvan Black T.....	B	A70	Cotton Ponceau.....	BK	300
Corvoline BT.....	B	U121	Cotton Pure Blue B.....	A	U1
Cotton Black.....	S	462c	Cotton Purple 5 BN.....	B	366
Cotton Black.....	WD	738	Cotton Red.....	B	363
Cotton Black (V. M.).....	K	A396	Cotton Red.....	tM	307
Cotton Black 3 B.....	B	A71	Cotton Red A.....	C	307a
Cotton Black BGX.....	B	A72	Cotton Red 65 A, 201 A.....	Lev	307a
Cotton Black BNX.....	B	A73	Cotton Red B.....	S	365
Cotton Black BT.....	Q	462c	Cotton Red 4 B.....	B	363
Cotton Black CC, CT.....	Lev	462c	Cotton Red 4 B.....	GrE	307
Cotton Black CK.....	K	A396	Cotton Red 8 BN.....	CG	307a
Cotton Black E.....	B	463	Cotton Rubine.....	B	313
Cotton Black GB.....	K	A396	Cotton Ruby.....	Lev	313a
Cotton Black GS, RS.....	S	462c	Cotton Scarlet.....	B	227
Cotton Black PF.....	B	A75	Cotton Scarlet.....	K	U334
Cotton Black RW.....	B	462h	Cotton Scarlet.....	Q	227b
Cotton Black UG.....	K	A396	Cotton Scarlet NP, NPX.....	B	227
Cotton Black V, Y.....	Lev	462c	Cotton Violet 43 A.....	Lev	U735
Cotton Black 4.....	B	A74	Cotton Violet 2 B.....	Q	U796
Cotton Blue.....	WD	538	Cotton Violet 5 B.....	Q	U797
Cotton Blue.....	..	649	Cotton Violet R.....	R	U798
Cotton Blue (V. M.).....	Lev	538a	Cotton Violet X.....	Lev	U735
Cotton Blue B.....	K	U328	Cotton Yellow.....	Q	199b
Cotton Blue BCB.....	CG	U490	Cotton Yellow CH.....	I	304
Cotton Blue BCB.....	Q	538a	Cotton Yellow G.....	B	296
Cotton Blue BR.....	K	U328	Cotton Yellow GI, GX.....	B	296
Cotton Blue BSJ.....	GrE	538a	Cotton Yellow R.....	B	199
Cotton Blue CC.....	K	U328	Cresol Black (V. M.).....	GrE	U510
Cotton Blue G.....	M	539	Cresotine Yellow G.....	GrE, M	351
Cotton Blue N.....	B	649	Cresotine Yellow GOO.....	GrE	351
Cotton Blue OOO.....	Q	538a	Cresotine Yellow R.....	GrE	395
Cotton Blue R, RN.....	B	649	Cresyl Blue BBS, RRN.....	L	621
Cotton Blue 5190.....	BK	538a	Cresyl Fast Violet 2 B.....	L	U517
Cotton Blue Double conc.....	..	539	Crimson BBT.....	By	163a
Cotton Brown.....	WD	737	Crimson Benine G.....	AW	U569
Cotton Brown (V. M.).....	C	460	Croceine AZ.....	C	225
Cotton Brown B.....	K	U329	Croceine B.....	Sch	226
Cotton Brown B.....	Lev	490a	Croceine 3 B.....	Sch	235
Cotton Brown CNP.....	B	U122	Croceine Orange.....	Var	37
Cotton Brown CR.....	Q	490a	Croceine Orange G.....	Var	37
Cotton Brown FS.....	Lev	490a	Croceine Orange R.....	Sch	70
Cotton Brown 4 G.....	K	U329	Croceine Orange X.....	C	37
Cotton Brown M.....	S	490a	Croceine Orange Y.....	Sch	37
Cotton Brown O, 2 R.....	K	U329	Croceine Scarlet (V. M.).....	K	169a
Cotton Brown 3 R.....	Lev	490a	Croceine Scarlet 3 B.....	By, etc.	249
Cotton Brown RN.....	B	U123	Croceine Scarlet 7 B, 8 B.....	By	255
Cotton Brown T.....	I, S	490a	Croceine Scarlet 10 B.....	By	249a
Cotton Brown V.....	K	U329	Croceine Scarlet 8 BL.....	K	255
Cotton Brown 100, 137, 153	Lev	490a	Croceine Scarlet 2 BX.....	By	167
Cotton Corinth G.....	B, GrE	312	Croceine Scarlet 3 BX.....	By, K	167
Cotton Cutch 21 A.....	Lev	A732	Croceine Scarlet MO.....	WD	A527
Cotton Dark Green B, N.....	K	U330	Croceine Scarlet MOO.....	Sch	227
Cotton Dark Green 138.....	Lev	U732	Croceine Scarlet MOO.....	WD	A528
Cotton Fast Red 4 BSP, 4 BX	B	363	Croceine Scarlet O.....	K	251
Cotton Green.....	K	U331	Croceine Scarlet OO.....	K	251
Cotton Green A, 88 A, 105 A, B.....	Lev	U733	Cross Dye Black (V. M.).....	H	720II
Cotton Green D.....	S	A714	Cross Dye Blue FR.....	H	S174
Cotton Green 2 G.....	L	U516	Cross Dye Brown 2 D.....	H	S175
Cotton Marine Blue.....	K	U332	Cross Dye Brown 4 R.....	H	S176
Cotton Milling Black.....	B	U124	Cross Dye Drab N.....	H	S177
			Cross Dye Green G.....	H	S181



Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Cross Dye Yellow D.....	H	S178	Developed Blue GG.....	AW	U574
Cross Dye Yellow R.....	H	S179	Developed Brown M.....	AW	U575
Cross Dye Yellow Y.....	H	S180	Developed Green F.....	AW	U576
Crumpsall Direct Fast			Diamine Aldehyde Blue.....	C	A338
Brown B.....	Lev	444	Diamine Aldehyde Scarlet..	C	A339
Crumpsall Direct Fast			Diamine Azo Blue.....	C	A340
Brown O.....	Lev	445	Diamine Azo Bordeaux B...	C	A341
Crumpsall Direct Fast Red R	Lev	341	Diamine Azo Scarlet (V.M.)	C	A342
Crumpsall Yellow.....	Lev	178	Diamine Black (V. M.).....	C	333b
Crystal Orange.....	Var	38	Diamine Black BH.....	C	333
Crystal Orange 2 G.....	Var	38	Diamine Black BO.....	C	403
Crystal Ponceau.....	B, etc.	113	Diamine Black HW.....	C	473
Crystal Ponceau 6 R.....	A, BK	113	Diamine Black RO.....	C	328
Crystal Scarlet.....	WD	U543	Diamine Blue Black E.....	C	402
Crystal Scarlet 6 R.....	C	U286	Diamine Blue (V. M.).....	C	384a
Crystal Violet.....	Var	516	Diamine Blue 2 B.....	C	337
Crystal Violet 5 BO.....	...	516	Diamine Blue 3 B.....	C	391
Crystal Violet 6 B.....	A	516	Diamine Blue BX.....	C	386
Crystal Violet CV.....	B	516	Diamine Blue C 2 R.....	C	384
Crystal Violet 484.....	I	516	Diamine Blue 6 G.....	C	271
Cumidine Scarlet.....	Sch	83	Diamine Blue 3 R.....	C	401
Cupranil Brown R.....	I	A689	Diamine Blue RW.....	C	419
Cupranil Brown.....	I	A687	Diamine Brilliant Blue G.....	C	418
Cupranil Brown G.....	I	A688	Diamine Brilliant Bordeaux R	C	319a
Cupranil Brown 12366.....	I	A690	Diamine Brilliant Rubine.....	C	A343
Cupranil Brown 15596.....	I	A690	Diamine Brilliant Scarlet.....	C	A344
Cupranil Brown 15903.....	I	A690	Diamine Brilliant Violet.....	C	A345
Curcumeine.....	A, BK	140	Diamine Bronze G.....	C	448
Curcumeine GG.....	BK	140	Diamine Brown (V. M.).....	C	344
Curcumeine S.....	A	140	Diamine Brown B.....	C	349
Curcumeine.....	tM, G	142	Diamine Brown M.....	C	344
Curcumeine L, LC.....	G	142	Diamine Brown V.....	C	329
Curcumeine 8000.....	L	9	Diamine Catechine (V.M.)..	C	A346
Curcuphenine.....	CICo	16	Diamine Catechine G.....	S	A716
Curch Brown.....	AW	A540	Diamine Cutch.....	C	432
Curch Brown D.....	M	A426	Diamine Dark Blue B.....	C	A347
Cutch Brown R.....	S	A715	Diamine Dark Green N.....	C	A348
Cutch Brown 1759.....	I	A691	Diamine Fast Black (V.M.)..	C	A349
Cyanthracene Blue 3 B.....	CV	U727	Diamine Fast Blue (V. M.)..	C	A351
Cyanthracene Blue 2 BL.....	CV	U728	Diamine Fast Bordeaux.....	C	A352
Cyanthracene Yellow S.....	CV	U729	Diamine Fast Brown (V.M.)..	C	A353
Cyanthrol BGA, G, 3 GO.....	B	860	Diamine Fast Gray.....	C	A354
Cyananthrol R, RB.....	B	859	Diamine Fast Orange (V.M.)..	C	A355
Cyananthrol RBA, RBX.....	B	859	Diamine Fast Red F & (V.M.)	C	343
Cyananthrol RXO, RBY.....	B	859	Diamine Fast Scarlet (V.M.)..	C	A357
Cyanazurine.....	DH	630	Diamine Fast Violet (V.M.)..	C	A358
Cyanine B.....	A, M	544	Diamine Fast Yellow (V.M.)..	C	617a
Cyanine BF.....	A	544	Diamine Fast Yellow 3 G.....	C	296
Cyanine Blue.....	CV	U544a	Diamine Gold.....	C	431
Cyanine Blue.....	tM	U627	Diamine Golden Yellow.....	C	431
Cyanogen Blue 13623.....	I	U604	Diamine Gray G.....	C	241
Cyanol (V. M.).....	C	546	Diamine Green (V. M.).....	C	474a
Cyanol Green (V. M.).....	C	566b	Diamine Green B.....	C	474
Cyanol Fast Green B.....	C	566	Diamine Green G.....	C	475
Cyanosine B.....	I	598	Diamine Heliotrope (V. M.)..	C	A360
Cyanosine spirit soluble.....	M, K, S	594	Diamine Jet Black (V. M.)..	C	A361
Cyprus Green B.....	A	A19	Diamine Neron (V. M.).....	C	A362
Dark Navy Blue 2035.....	Lev	537a	Diamine New Blue.....	C	A363
Dark Purple (printing paste)	Lev	U736	Diamine Nitrazol Brown G.....	C	A364
Deep Black D.....	tM	U528	Diamine Nitrazol Green.....	C	A365
Deep Fat Black Color.....	A	U2	Diamine Nitrazol Orange...	C	A366
Delphine Blue B.....	S, By	622	Diamine Orange (V. M.).....	C	A367
Deltapurpurin.....	I	366	Diamine Pure Blue.....	C	426
Deltapurpurin 3 B.....	AW	366a	Diamine Red B.....	C	366
Deltapurpurin 5 B.....	Var	366	Diamine Red 3 B.....	A	367
Deltapurpurin 7 B.....	Lev	367	Diamine Rose (V. M.).....	C	119
Develop Black.....	WD	333d	Diamine Rose FFB.....	C	121
Develop Black NZ.....	Q	333d	Diamine Scarlet (V. M.).....	C	319
Developed Black B.....	AW	U570	Diamine Scarlet HS.....	C	319
Developed Black BH.....	AW	333	Diamine Sky Blue FF.....	C	424
Developed Black N.....	AW	U571			
Developed Black R.....	AW	U572			
Developed Black W.....	AW	U573			

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Diamine Sky Blue (V.M.)	C	A368	Diazine Black 1401	K	125
Diamine Violet N.	C	327	Diazine Green S.	K	124
Diamine Violet Red B.	C	A369	Diazo Black B, OB, OT.	By	308
Diamine Yellow (V.M.)	C	A370	Diazo Black R.	By	308
Diamine Yellow CP.	C	304	Diazo Black 10020.	BK	308
Diamine Yellow N.	C	404	Diazo Black BHAD.	S	333
Diaminogen (V.M.)	C	274	Diazo Black BHN.	By	333
Diaminogen Blue (V.M.)	C	273	Diazo Black BHN.	WB	333
Diaminogen Blue BB, NA.	C	273	Diazo Blue X.	By	A236
Diaminogen Sky Blue N.	C	A373	Diazo Blue Black RS.	By	441
Diamond Black.	Var	275	Diazo Bordeaux 7 B.	By	A225
Diamond Black AF, CY, EA, ET.	By	275	Diazo Brilliant Black.	...	364
Diamond Black F.	B, L, By	275	Diazo Brilliant Black B.	By	364
Diamond Black FB.	B, By	275	Diazo Brilliant Orange GR.	By	A226
Diamond Black GA.	By	275	Diazo Brilliant Scarlet B.	By	A227
Diamond Black GAF.	B	275	Diazo Brilliant Scarlet 3 B.	By	A228
Diamond Black P 2 B, PV, PVT.	By	157	Diazo Brilliant Scarlet 6 B.	By	A232
Diamond Blue R.	By	164a	Diazo Brilliant Scarlet 2 BL.	By	A230
Diamond Blue Black EB.	By	181	Diazo Brilliant Scarlet 5 BL.	By	A231
Diamond Bordeaux R.	By	A222	Diazo Brilliant Scarlet BG.	By	A229
Diamond Flavine G.	By	102	Diazo Brilliant Scarlet G.	By	A233
Diamond Green.	...	270	Diazo Brilliant Scarlet PR.	By	A234
Diamond Green B.	B	495	Diazo Brilliant Scarlet PR.	WD	A230
Diamond Green B.	By	276	Diazo Brilliant Scarlet S 4 B.	By	A235
Diamond Green BX.	B	495	Diazo Brown G.	By	A237
Diamond Green G, GF, GN	B	499	Diazo Brown 3 G.	By	A238
Diamond Green 3 G.	By	276	Diazo Brown 6 G.	By	A239
Diamond Green SS.	By	276	Diazo Brown NR.	By	A240
Diamond Green special.	By	276	Diazo Brown 3 RB.	By	A241
Diamond Magenta.	B	U128	Diazo Fast Black.	By	A242
Diamond Magenta I.	B	U120	Diazo Fast Black BHX.	By	A243
Diamond Phosphine (V.M.)	C	600b	Diazo Fast Black G.	By	A244
Diamond Red BH.	By	A223	Diazo Fast Black MG.	By	A245
Diamond Red G.	By	A224	Diazo Fast Black SD.	By	A246
Diamond Violet BB.	AW	U577	Diazo Fast Black V.	By	A247
Diamond Yellow G.	By	204	Diazo Fast Bordeaux BL.	By	A248
Dianil Black PR.	M	491	Diazo Fast Green GE.	By	A249
Dianil Black R.	M	479	Diazo Fast Red 7 BL.	By	A250
Dianil Blue B.	M	380	Diazo Fast Violet BL.	By	A251
Dianil Blue G.	M	415	Diazo Fast Violet 3 RL.	By	A252
Dianil Blue R.	M	323	Diazo Fast Yellow G.	By	A253
Dianil Blue 2 R.	M	379	Diazo Fast Yellow 2 G.	By	A254
Dianil Crimson B.	M	A427	Diazogene Black.	AW	A541
Dianil Garnet B.	M	332	Diazogene Black AB.	AW	A542
Dianil Yellow 3 G.	M	25	Diazogene Black AD.	AW	A543
Dianil Yellow R.	M	26	Diazogene Black N.	AW	A545
Dianil Yellow 2 R.	M	27	Diazogene Blue R.	AW	A546
Dianisidine Blue.	M	408	Diazogene Blue 2 R, 4585.	K	A397
Dianol Black (V. M.)	Lev	436a	Diazogene Blue RD.	AW	A547
Dianol Black BH.	Lev	436a	Diazogene Garnet BB.	AW	A548
Dianol Black E.	Lev	436a	Diazogene Red 8 B.	AW	A549
Dianol Black EX.	Lev	436a	Diazo Indigo Blue BR.	By	274a
Dianol Black RO, RW.	Lev	328	Diazo Indigo Blue 2 RL, 3 RL.	By	274a
Dianol Blue 402.	Lev	424a	Diazomine Red L.	CV	U730
Dianol Brilliant Blue G.	Lev	424b	Diazo Olive G.	By	A255
Dianol Brown CDFB.	Lev	356a	Diazophenyl Black I.	G	A613
Dianol Brown LF.	Lev	356a	Diazophenyl Blue BC.	G	A614
Dianol Fast Red K.	BD	279	Diazo Pure Blue 3 GL.	By	A255a
Dianol Fast Red FG.	BD	343	Diazo Rubine B.	By	A256
Dianol Green B.	Lev	474	Diazo Sky Blue 3 GL.	By	A258
Dianol Orange 217 A.	L.v	356b	Diazo Sky Blue B.	By	A257
Dianol Orange Brown.	Lev	356c	Diazurine B.	By	406
Dianol Orange Brown X.	BD	356	Dichroine Brown.	Q	U790
Dianol Red B.	Lev	357	Dicyanine.	M	U431
Dianol Red 2 B.	Lev	356	Dimethyl-indigo.	M	888
Dianthrene Blue 2 B.	I	881	Dioxine.	L	3
Diazanil BB.	M	273	Diphen Blue B.	A	695a
Diazanil Scarlet B.	M	A428	Diphen Blue R.	A	690
Diazanil Scarlet 6 B.	M	A429	Diphenylamine Blue.	DH	520
Diazine Black.	K	125	Diphenyl Black.	M	922
Diazine Black H.	Sch	333	Diphenyl Black L.	G	A615
			Diphenyl Black RC.	G	A616
			Diphenyl Blue 3 BC.	G	A617

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Diphenyl Blue BEC.....	G	A618	Direct Blue AB.....	Q	428a
Diphenyl Blue BTC.....	G	A620	Direct Blue B.....	I	428
Diphenyl Blue BBEC.....	G	A619	Direct Blue 3 B.....	I	428a
Diphenyl Blue 2 R.....	G	A621	Direct Blue 5 B.....	BK	379b
Diphenyl Blue Black.....	G	334	Direct Blue 5 B.....	Q	428a
Diphenyl Brown BBNC, BGN.....	G	348	Direct Blue 7 B, 12 B, BK, FF.....	K	U336
Diphenyl Brown BN, BVGN	G	348	Direct Blue BX.....	I	428a
Diphenyl Brown 3 GN, 3 GNC.....	G	393	Direct Blue C, G.....	AW	428a
Diphenyl Brown GS.....	G	348	Direct Blue 3 G.....	S	428a
Diphenyl Brown RN.....	G	347	Direct Blue GN.....	CG	428a
Diphenyl Brown TB.....	G	440	Direct Blue GRC, N 2 B, R, 5 R.....	K	U336
Diphenyl Catechine G.....	G	206	Direct Blue R.....	I	397
Diphenyl Chlorine Yellow FF	G	617	Direct Blue RW.....	I	428a
Diphenyl Chlorine Yellow G, 229.....	G	18a	Direct Blue WBB.....	WB	337
Diphenyl Chrysoine G, GC.....	G	14	Direct Blue X 2 B.....	K	U336
Diphenyl Chrysoine 3 GN, GOO.....	G	14	Direct Blue 30.....	I	428a
Diphenyl Chrysoine RR.....	G	205	Direct Blue 7079.....	CV	428a
Diphenyl Citronine G.....	G	12	Direct Blue 13108, 13503.....	I	428a
Diphenyl Dark Green BC.....	G	A633	Direct Blue 51096.....	H	428a
Diphenyl Deep Black GC.....	G	A622	Direct Blue Black B.....	By	455
Diphenyl Deep Black GN.....	G	A623	Direct Blue Black 313.....	Lev	455b
Diphenyl Deep Black GWC.....	G	A624	Direct Brilliant Blue 8 B.....	I	428b
Diphenyl Deep Black VN.....	G	A625	Direct Brown.....	L	A502
Diphenyl Deep Black VP.....	G	A626	Direct Brown (V. M.).....	K	U337
Diphenyl Fast Black.....	G	295	Direct Brown B, H.....	K	U337
Diphenyl Fast Brown G, GNC.....	G	207	Direct Brown G.....	L	A503
Diphenyl Fast Gray BC.....	G	A627	Direct Brown 2 G.....	..	457
Diphenyl Fast Red.....	G	343	Direct Brown 3 GNC.....	G	A636
Diphenyl Fast Violet BC.....	G	A628	Direct Brown HB.....	I	A504
Diphenyl Fast Yellow extra	G	18	Direct Brown J, JJB, JP.....	I	486
Diphenyl Fast Yellow G.....	G	18	Direct Brown M.....	I	344
Diphenyl Green BC.....	G	A629	Direct Brown N.....	L	A505
Diphenyl Green G.....	G	467	Direct Brown RW.....	Q	344a
Diphenyl Green 3 G.....	G	468	Direct Brown TB.....	K	U337
Diphenyl Green 3 GC, 3 GF	G	A629	Direct Catechine G.....	S	A717
Diphenyl Green KGW.....	G	467	Direct Catechine 30.....	S	A718
Diphenyl Orange GG.....	G	13a	Direct Chrome Black 14722	I	A694
Diphenyl Orange RR.....	G	13	Direct Chrome Brown.....	AW	A552
Diphenyl Red 8 B, SC.....	G	358	Direct Cotton Blue GS, RDB	K	U338
Diphenyl Red 184, 340.....	G	358	Direct Cotton Gray.....	K	U340
Diphenyl Scarlet 3 B.....	G	A634	Direct Cotton Green 2 B.....	K	U339
Diphenyl Violet BVC.....	G	A635	Direct Cutch GG.....	I	A695
Disulphine Blue 47073 DS.....	H	U753	Direct Dark Brown M.....	L	344
Direct Black (V. M.).....	H	442a	Direct Dark Green.....	K	U341
Direct Black ABC.....	AW	A550	Direct Dark Green S.....	I	478b
Direct Black C.....	AW	A551	Direct Dark Violet BE.....	K	U342
Direct Black D.....	K	U335	Direct Deep Black E.....	A	A20
Direct Black D.....	Q	442a	Direct Deep Black E.....	By	462a
Direct Black DB.....	K	U335	Direct Deep Black EW.....	By	462
Direct Black E.....	I	A692	Direct Deep Black NTS.....	K	U343
Direct Black FBS.....	By	A259	Direct Deep Black RW.....	By	463
Direct Black FBS.....	CG	333a	Direct Fast Black B.....	I	A696
Direct Black G.....	K	U335	Direct Fast Blue.....	AW	A553
Direct Black 3 G.....	S	442a	Direct Fast Blue FFB.....	K	U344
Direct Black 3 R.....	K	U335	Direct Fast Brown C, GB.....	K	U345
Direct Black RC.....	By	A260	Direct Fast Brown GG.....	By	A262
Direct Black RO.....	S	442a	Direct Fast Gray RN.....	K	U346
Direct Black T.....	K	U335	Direct Fast Orange 16710.....	I	392c
Direct Black V.....	S	442	Direct Fast Red F.....	I	343
Direct Black VT.....	By	A261	Direct Fast Red 17727, 25420	I	343a
Direct Black WC, 3899, 3919	K	U335	Direct Fast Scarlet (V. M.).....	I	A698
Direct Black 7565.....	CV	442a	Direct Fast Scarlet 4 BS, 8 BS.....	S	U704
Direct Black 8535.....	K	U335	Direct Fast Scarlet 4 BS, 8 BS.....	K	U347
Direct Black 14714.....	I	A693	Direct Fast Scarlet SE.....	I	279
Direct Black 33336.....	S	442a	Direct Fast Violet 3654.....	K	U348
Direct Blue.....	H	428a	Direct Fast Yellow.....	tM	617c
Direct Blue (V. M.).....	K	U336	Direct Fast Yellow OO, R.....	GrE	617c
Direct Blue A.....	K	U336	Direct Gray B.....	I	398
			Direct Gray B, J.....	P	681
			Direct Gray R.....	I	354

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
reen	I	478a	Direct Yellow VII	WB	342
reen B	CG	A444	Direct Yellow Z	Q	9h
reen B	I, S	478a	Direct Yellow 242	ClCo	9
reen C	CG	A445	Direct Yellow 10305	I	304b
reen G	CG	A446	Domingo Alizarin Black RFL	L	A507
reen G	S	475	Domingo Alizarin Black G	L	A508
reen 3 GG, Y	I	478a	Domingo Alizarin Blue R	L	A509
reen KGD	CG	A447	Domingo Alizarin Bordeaux	L	A500a
reen U	Q	478a	Domingo Black 40216	L	A510
reen 10865	CG	A448	Domingo Blue Black B	L	216
reen 9753, 34267	S	478a	Domingo Violet A	L	61
ndigo Blue A	I	439	Double Brilliant Scarlet G	tM, etc.	174
ndigo Blue BK	I	440	Double Ponceau R	By	108
ndigo Blue BN	I	353	Double Ponceau 2 R	By	A263
ndone Blue R	S	443	Double Ponceau 4 R	By	A264
avy Blue	K	U349	Double Scarlet	K	247
avy Blue B	K	U349	Double Scarlet extra S	A, Lev	170
range BR, G	S	302b	Drazuline Alizarin	AW	A554
range G	I	392	Drazuline Black BIL	AW	A555
range H	G	11b	Drazuline Blue 10 B	AW	A556
range R	I	362	Drazuline Blue 2 BFL	AW	A557
range R	K	11a	Drazuline Blue CV	AW	A558
range 6 R	L	A506	Drazuline Blue F	AW	A559
range 1901	BK	302b	Drazuline Blue FF	K	U352
range 6693	I	302b	Drazuline Blue FS	AW	A560
ure Blue	CG	U491	Drazuline Blue RFL	AW	A561
urple N	K	U350	Drazuline Blue VVV	AW	A563
ed	I, S	307b	Drazuline Blue Black HWT	AW	A561
ed B	DH	307b	Drazuline Bordeaux 6 B	AW	A564
ed 3 B	K	307b	Drazuline Brilliant Yellow	AW	A565
ed N	S	U351	Drazuline Brown C 3 B	AW	A566
ed 215, 1725	I	307b	Drazuline Brown FL	AW	A567
franine B	I	A699	Drazuline Brown G	AW	A568
arlet AB	Q	U800	Drazuline Brown 3 GL	AW	A569
arlet B	S	U705	Drazuline Brown 4 J	AW	A570
arlet 3 B	S	U706	Drazuline Brown R	AW	A571
arlet FB	BK	U480	Drazuline Chlorine Yellow G	AW	A572
xy Blue	I	A700	Drazuline Diamond Violet		
xy Blue B	WB	426	BB	AW	A573
xy Blue FF	S	A710	Drazuline Fast Blue 4 GFL	AW	A574
xy Blue 22	S	A720	Drazuline Fast Gray	AW	A575
xy Blue 13108	I	A700	Drazuline Fast Red	AW	A576
xy Blue, greenish	...	424	Drazuline Fast Red F	AW	A577
olet B	H	413a	Drazuline Fast Yellow B	AW	A578
olet BB	I	413	Drazuline Garnet BB	AW	A579
olet R	CG	A440	Drazuline Garnet FL	AW	A580
olet R	Q	352	Drazuline Green BX	AW	A581
olet R	I	352	Drazuline Indigo Blue	AW	A582
olet RR	S	413a	Drazuline New Red	AW	A583
olet 3653, 4561	K	A398	Drazuline New Red 10 B	AW	A584
olet 11508	CG	A460	Drazuline Orange FL	AW	A585
olet, 12932, 18510	I	413a	Drazuline Orange G	AW	A586
ellow (V. M.)	K	9b	Drazuline Orange R	AW	A587
ellow B	A	9g	Drazuline Red F	AW	A589
ellow BK	K	9b	Drazuline Red FL	AW	A590
ellow C	S	9c	Drazuline Red FV	AW	A591
ellow CA	H	9h	Drazuline Scarlet B	AW	A592
ellow CR	I	304b	Drazuline Sky Blue FF	AW	A593
ellow EG00	GrE	A460	Drazuline Violet D	AW	A594
ellow F	Sch	9	Drazuline Violet NPL	AW	A595
ellow G, GBE, GR	K	9b	Drazuline Violet VB	AW	A596
ellow G	L	304b	Drazuline Yellow R	AW	A597
ellow 2 G	K	9b	Drazuline Yellow R	M	U433
ellow 6 G	S	9f	Drazuline Yellow S	AW	A599
ellow GOO	GrE	A460	Drazuline Yellow T	AW	A598
ellow MC	G	9d	Duranthrene Blue CG	...	842
ellow PC	Q	9h	Duranthrene Blue RS	...	848
ellow PI	K	9b	Duranthrene Yellow	...	849
ellow R	By, GrE	9	Durindone Blue 4 B	BD	881
ellow R	GrE	A461	Durindone Blue 5 B	BD	882
ellow 2 RFL	Sch	9	Durindone Blue 6 B	BD	883
ellow TO	I	617b	Durindone Red B	BD	912
ellow V	AW	9c	Durindone Red N	BD	917

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Durindone Scarlet R.....	BD	905	Eriochrome Green H.....	G	U615
Dutch Yellow.....	FA	103	Eriochrome Green L.....	G	U616
Eboli Blue B.....	L	389	Eriochrome Green M.....	G	U617
Eboli Green.....	L	466	Eriochrome Green O.....	G	U618
Eclipse Black C.....	G	720G	Eriochrome Olive G.....	G	U619
Eclipse Brown B.....	G	S141	Eriochrome Phosphine R...	G	133
Eclipse Brown GC.....	G	S142	Eriochrome Red A.W. B...	G	29
Eclipse Brown R.....	G	S143	Eriochrome Verdon A. S...	G	260
Eclipse Fast Brown BC.....	G	S144	Eriochrome Violet B.....	G	A643
Eclipse Fast Brown GC.....	G	S145	Eriochrome Violet 2 BL...	G	A644
Eclipse Fast Brown 3 GC...	G	S146	Eriochrome Yellow 2 G...	G	A645
Eclipse Fast Brown 4 R.....	G	S147	Eriochrome Yellow 3 G...	G	A646
Eclipse Fast Dark Brown BC	G	S148	Eriochrome Yellow GR.....	G	A647
Eclipse Fast Red Brown.....	G	S149	Eriochrome Yellow S.....	G	A648
Eclipse Fast Red Brown E...	G	S150	Eriocyanine A, AC, R...	G	531
Eclipse Phosphine GGC.....	G	S151	Erio Fast Blue SWR.....	G	A637
Eclipse Phosphine RRC.....	G	S152	Erioflavine SX.....	G	19
Eclipse Yellow G.....	G	S153	Eriofloxine 6 B.....	G	66
Eclipse Yellow 3 G.....	G	S154	Eriofloxine 2 G.....	G	42
Emine Red.....	A	123	Erioglaucine.....	G	506
Eosamine B, G.....	A	100	Erioglaucine A, AP, EP, X.	G	506
Eosine.....	Var	587	Erioglaucine 49141.....	H	506
Eosine (V. M.).....	Var	587	Erio Green B.....	G	564
Eosine A.....	B, By	587a	Erio Green N.....	G	564
Eosine AG.....	B	587a	Erio Green Supra.....	G	564
Eosine AG, A 3 G, BB.....	M	587	Eriorubine B.....	G	A649
Eosine BN, BNL.....	B	590	Erio Violet BC.....	G	U610
Eosine CA, W.....	B	587a	Erio Violet RLC.....	G	U611
Eosine S, SP.....	B	589	Erioviridine B.....	G	503
Eosine Spirit Soluble.....	tM	588	Erweco Alizarin Acid Blue R	RWCo	857
Eosine (yellowish) 701.....	G	587	Erweco Alizarin Acid Red BS	RWCo	781
Era Black J.....	Lev	275	Erythrine 7 B.....	B	255
Ergane Yellow G.....	B	U130	Erythrine C.....	C	A374
Ergane Yellow R.....	B	U131	Erythrine F.....	B	228
Ergane Yellow W.....	B	U132	Erythrine RR.....	B	249
Erganone Blue B.....	B	U133	Erythrosine.....	M	592
Erganone Blue G.....	B	U134	Erythrosine A.....	M	592
Erganone Gray B.....	B	U135	Erythrosine B.....	M, etc.	592
Erganone Violet R.....	B	U136	Erythrosine G.....	B, L	591
Erica B.....	A, etc.	121	Ethyl Acid Blue RR.....	B	63
Erica BB.....	S	121	Ethyl Acid Violet S 4 BXX.	B	61
Erica BN.....	A	121	Ethyl Blue B.....	B	A 76
Erica G.....	A, Lev	122	Ethyl Purple.....	B, etc.	518
Erica G.....	S	122a	Ethyl Violet.....	B, G	518
Erica GN.....	A	122	Ethyl Violet.....	M, I	518
Erica 2 GN.....	A	117	Ethyl Violet S682.....	I	518
Erie Direct Black G, GX...	Sch	462	Euchrysine (V.M.).....	B	608
Erie Direct Black R.....	Sch	463	Euchrysine RR, GG, GNX,		
Erie Direct Black RX.....	Sch	463	GRNT.....	B	608
Erie Direct Brown GB.....	Sch	477a	Euchrysine NX, RT, RRD.	B	608
Erie Direct Brown GR.....	Sch	477	Euchrysine 3R, 3 RX.....	B	603
Erie Direct Brown 3 RB...	Sch	344	Excelsior Black.....	AW	A600
Erie Direct Brown RF, 2 RF	Sch	488	Excelsior Lake Scarlet (V.M.)	C	A375
Erie Direct Green ET.....	Sch	464	Excelsior Scarlet G.....	M	U434
Erie Direct Green MT.....	Sch	474	Excelsior Scarlet 3 R.....	M	U435
Erie Direct Green WT.....	Sch	464	Export Blue 1504.....	B	U137
Erie Orange 2 R.....	Sch	311	Fast Acid Blue.....	...	562
Eriozurine BC.....	G	A638	Fast Acid Blue B.....	By	562
Eriocarmine 2 BC.....	G	A639	Fast Acid Blue 3 B.....	Q	562d
Eriochromal Brown EB.....	G	U612	Fast Acid Blue R.....	M	584
Eriochromal Gray 5 G.....	G	U613	Fast Acid Blue RH.....	H	584a
Eriochrome Azurol B, BC...	G	551	Fast Acid Eosine G.....	M	581
Eriochrome Azurol S.....	G	554	Fast Acid Fuchsin B.....	By	41
Eriochrome Black A.....	G	184	Fast Acid Green RH.....	H	503a
Eriochrome Black T.....	G	183	Fast Acid Magenta G.....	M	581a
Eriochrome Blue Black B, BC	G	180	Fast Acid Marine Blue		
Eriochrome Blue Black G.....	G	180a	HBEX.....	B	U138
Eriochrome Blue Black R.....	G	181	Fast Acid Navy Blue GRI..	I	U665
Eriochrome Brown RC.....	G	A640	Fast Acid Phloxine A.....	M	581
Eriochrome Brown SDE.....	G	A641	Fast Acid Red A.....	M	581b
Eriochrome Brown V.....	G	A642	Fast Acid Red EB, EGG...	L	67a
Eriochrome Cyanine R, RC...	G	553	Fast Acid Red RH.....	H	67a
Eriochrome Geranol R.....	G	U614	Fast Acid Violet.....	AW, C	580a

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Acid Violet . . . . .	...	582	Fast Mordant Yellow . . . . .	Var	294
Acid Violet A 2 R . . . . .	M	582	Fast Mordant Yellow G . . . . .	B	294
Acid Violet B . . . . .	By	562	Fast Navy Blue . . . . .	K	649
Acid Violet B . . . . .	M	580	Fast Navy Blue A . . . . .	GrE	649
Acid Violet 3 B . . . . .	K	U353	Fast Navy Blue B NNOO, . . . . .		
Acid Violet 10 B . . . . .	By	528	KZOO . . . . .	GrF	649
Acid Violet ERR . . . . .	B	U139	Fast Neutral Violet B . . . . .	C	678
Acid Violet R . . . . .	K	U353	Fast Orange 1 G . . . . .	I	35
Acid Violet R, RBE . . . . .	M	580a	Fast Orange O . . . . .	M	148
Acid Violet RGE . . . . .	M	582	Fast Paper Yellow G . . . . .	CG	U492
Acid Violet RX . . . . .	H	580a	Fast Parme . . . . .	AW	U580
Acid Violet 416 . . . . .	K	U353	Fast Pink BN, GN . . . . .	I	694
Acid Yellow (V.M.) . . . . .	C	23a	Fast Pink for silk . . . . .	DH	694
Acid Yellow RBE . . . . .	M	U436	Fast Ponceau L . . . . .	By	A265
Acid Yellow RH . . . . .	H	137a	Fast Printing Green . . . . .	K	2
Black . . . . .	G	U622	Fast Printing Yellow R . . . . .	By	U240
Black . . . . .	L	658	Fast Red A . . . . .	Var	161
Black B . . . . .	B	740	Fast Red A . . . . .	B	A77
Black BS . . . . .	B	741	Fast Red . . . . .	Var	168
Black N . . . . .	B	160	Fast Red . . . . .	Var	161
Blue . . . . .	tM	699	Fast Red A . . . . .	WB	166
Blue AO000 . . . . .	GrE	699b	Fast Red ANSX . . . . .	B	A78
Blue B . . . . .	A	697	Fast Red AV . . . . .	B, By	161
Blue B . . . . .	AW	699	Fast Red B . . . . .	B, etc.	112
Blue BB . . . . .	G	U623	Fast Red BN . . . . .	B	112
Blue 3 BB . . . . .	GrE	699b	Fast Red BT . . . . .	By, etc.	111
Blue O . . . . .	M	699	Fast Red CJ . . . . .	B	163
Blue R . . . . .	B, K	699	Fast Red E . . . . .	Var	166
Blue RD . . . . .	A	649	Fast Red IBS . . . . .	B	A79
Blue Z . . . . .	G	U624	Fast Red NS . . . . .	By	168
Blue 62105 . . . . .	A	649	Fast Red O . . . . .	M	161
Bordeaux B . . . . .	BK	236a	Fast Red S . . . . .	Sch	161
Bordeaux G . . . . .	BK	236a	Fast Red VR . . . . .	By	164
Brilliant Acid Carmine . . . . .			Fast Russian Green . . . . .	WD	U545
Brilliant Black 12349 . . . . .	GrE	66c	Fast Sailor Blue A, R . . . . .	AW	649
Brown . . . . .	I	U666	Fast Scarlet B . . . . .	B	U141
Brown . . . . .	A	172	Fast Scarlet B . . . . .	K	248
Brown . . . . .	By	213	Fast Scarlet BX . . . . .	B	U142
Brown 3 B . . . . .	A	172	Fast Scarlet BXG . . . . .	B	U143
Brown G . . . . .	A	212	Fast Straw Yellow V . . . . .	AW	A601
Brown GS . . . . .	G	U625	Fast Sulfon Black . . . . .	...	264
Brown N . . . . .	B	160	Fast Sulfon Black F . . . . .	S	264
Brown O . . . . .	M	214	Fast Sulfon Violet 5 BS . . . . .	S	182
Chrome Black . . . . .	AW	U578	Fast Sulfon Violet 4 R . . . . .	S	182
Chrome Black . . . . .	H	275a	Fast Toluylene Red . . . . .	GrE	358a
Chrome Black K . . . . .	BK	U481	Fast Victoria Violet S 4 B . . . . .	GrE	61d
Chrome Blue FR . . . . .	Q	U801	Fast Violet R . . . . .	AW	A602
Cotton Blue 6 GO . . . . .	L	U518	Fast Wool Blue I . . . . .	AW	U581
Cotton Yellow . . . . .	WD	U544	Fast Wool Scarlet 4 R . . . . .	BK	U482
Direct Yellow 22090 . . . . .	S	304b	Fast Yellow . . . . .	Var	137
Eosine L . . . . .	B	590b	Fast Yellow FY . . . . .	Lev	137
Garnet 5 B . . . . .	AW	U579	Fast Yellow GR . . . . .	tM	137
Gray B . . . . .	GrE	681	Fast Yellow N . . . . .	P	150
Gray RGB . . . . .	CG	681	Fast Yellow R . . . . .	K, BK	149
Green B . . . . .	tM	U529	Fast Yellow S . . . . .	C	137
Green CR . . . . .	By	523	Fast Yellow Y . . . . .	B	149
Green bluish . . . . .	By	523	Fast Yellow 95 . . . . .	Q	137
Jene Blue F . . . . .	AW	U582	Fast Violet . . . . .	...	626
Jene Green GG . . . . .	AW	U583	Flavazine E 3 GL . . . . .	M	20a
Jene Violet B . . . . .	AW	U584	Flavazine L . . . . .	M	19
Jene Violet R . . . . .	AW	U585	Flavazine S . . . . .	M	20
Jene Yellow . . . . .	AW	U586	Flavazine T . . . . .	M	20a
Leather Yellow 20855 . . . . .	By	U239	Flavinduline II, O . . . . .	B	608
Light Green . . . . .	By	523a	Flavophosphine G, 4 G, R . . . . .	M	609d
Light Orange G . . . . .	By	38	Flavopurpurin . . . . .	...	785
Light Yellow G, 2 G, . . . . .			Fluoresceine . . . . .	Var	585
GGN . . . . .	By	19	Formyl Violet (V.M.) . . . . .	C	530
Light Yellow 3 G . . . . .	B	U140	Fraise . . . . .	P	U595
Light Yellow RG . . . . .	By	19a	French Blue . . . . .	Q	U802
Mordant Black FH . . . . .	M	275	French Red . . . . .	P, etc.	U593
Mordant Blue B . . . . .	Lev	U737	Fuchsine . . . . .	Var	512
Mordant Blue B . . . . .	M	A430	Fuchsine ASV . . . . .	P	512
Mordant Blue R . . . . .	M	A431	Fuchsine B . . . . .	tM	512

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Fuchsine I...	GrE	512	Guinea Fast Green 3 B...	A	U15
Fuchsine MB...	tM	512	Guinea Fast Green 2 G...	A	U16
Fuchsine NB...	Sch	513	Guinea Fast Red BL...	A	U17
Fuchsine S...	B	524	Guinea Fast Red 4 BL...	A	U18
Fuchsine TR...	Sch	512	Guinea Fast Red 2 R...	A	U19
Fulling Orange 16700...	I	250a	Guinea Fast Violet AL...	A	U20
Fur Black DM...	By	U241	Guinea Fast Violet 10 B...	A	U21
Fur Gray 27953...	By	U242	Guinea Green...	Var	502
Furreine DB...	I	923	Guinea Green B, G...	A	502
Fuscamine...		923	Guinea Green 2 G...	A	505
Gallamine Blue...	G, By	637	Guinea Red 4 R...	A	A24
Gallanic Violet R, B...	DH	639	Guinea Violet...	Var	530
Gallazine A...	DH	645	Guinea Violet 4 B, 6 B...	A	530a
Gallazol Blue 4 G...	G	U626	Guinea Violet S 4 B...	A	530
Galleine...	By, etc.	599	Half Wool Blue 3 R...	By	U246
Galleine JRG paste...	G	599	Half Wool Green 63816...	L	U519
Galleine SR, SW, W...	B	599	Half Wool Green 63816 N 5	L	U520
Gallocyanine...	Var	626	Hansa Green G...	M	U437
Gallocyanine D...	B	626	Hansa Rubine G...	M	U438
Gallocyanine DH...	I	626	Hansa Rubine O...	M	U439
Gallocyanine F...	B	626	Hansa Yellow G...	M	28
Gallocyanine MS...	DH	628	Hansa Yellow 5 G...	M	U441
Galloflavine W...	B	772	Hansa Yellow R...	M	U442
Gallo Green DH...	DH	629	Hat Black (V.M.)...	C	A376
Gallophenin P...	By	658a	Hat Black A, 4 AN...	GrE	U508
Gallo Violet D...	By	U243	Hat Black B...	A	U22
Gallo Violet DF...	By	U244	Hat Black L, S...	GrE	U508
Gallo Sky Blue B...		641	Havana Brown S...	C	U287
Gambine Y...	H	2	Helianthine...	B	138
Geranine 2B, G...	By	118	Helianthine G, GG, GFF, R	G	141
Geranium B...	S	512	Heligoland Black BH...	G	436
Gentiana Violet B...	A	U4	Heligoland Black FFX...	G	436
Gentianine A...	G	659b	Heligoland Blue 6 B...	G	424
Glacier Blue...	I	501	Heligoland Blue RW...	G	A453
Gloria Black N...	By	U245	Helindone Black RRG...	M	921
Glycine Corinth...	Ki	310	Helindone Blue BB...	M	880
Glycine Red...	Ki	309	Helindone Blue 3 GN...	M	896
Golden Brown...	A	288	Helindone Blue 3 R...	M	896a
Golden Orange...	By	145	Helindone Brown...	M	904a
Gray NO...	S	698a	Helindone Brown AN...	M	873
Gray Blue 0095...	K	U357	Helindone Brown CR...	M	904a
Green A...	H	495a	Helindone Brown G...	M	904
Green BX...	AW	U587	Helindone Brown 3 GN...	M	836
Green G...	K	U354	Helindone Brown 2 R...	M	902
Green HD...	H	495a	Helindone Brown 5 R...	M	903
Green PLX...	B	4	Helindone Fast Scarlet C...	M	907
Green VGW...	B	U144	Helindone Fast Scarlet R, RC	M	915
Green 21...	S	U707	Helindone Gray 2 B, BR...	M	921
Green 241...	Q	U803	Helindone Green G...	M	892
Green 15825...	H	495a	Helindone Printing Black		
Green Crystals DIIa...	K	U356	2 RG...	M	921a
Green Crystals E...	tM	495	Helindone Orange D...	M	914
Green Crystals F...	H	495	Helindone Orange GRN...	M	835
Green Crystals M...	tM	495	Helindone Orange R...	M	913
Green Crystals X...	K	U356	Helindone Pink...	M	910
Green Crystals YD...	H	495	Helindone Pink AN, BN...	M	910
Green Crystals Ila...	K	U356	Helindone Red B...	M	917
Green residue...	K	U355	Helindone Red 3 B...	M	918
Green residue D...	K	U355	Helindone Scarlet S...	M	916
Grela Red R...	GrE	U507	Helindone Violet...	M	920
Guernsey Blue O...	M	539	Helindone Violet B, BB...	M	920
Guinea Black 3 BL...	A	U5	Helindone Violet D...	M	898
Guinea Bordeaux B...	A	U6	Helindone Violet R...	M	920
Guinea Bordeaux 6 B...	A	U7	Helindone Yellow CG...	M	810a
Guinea Bordeaux BL...	A	U8	Helindone Yellow GG vat...	M	810
Guinea Brown R...	A	U9	Helindone Yellow 3 GN...	M	810
Guinea Brown 2 R...	A	U10	Helindone Yellow RN...	M	810a
Guinea Carmine B...	A	A22	Helio Bordeaux BL...	By	A266
Guinea Carmine D...	A	A23	Helio Fast Blue BL...	By	858
Guinea Cyanine LB...	A	U11	Helio Fast Red...	By	73
Guinea Cyanine LG...	A	U12	Helio Fast Red RL, TRL...	By	73
Guinea Cyanine LR...	A	U13	Helio Fast Ruberine RL...	By	A268
Guinea Fast Green B...	A	503	Helio Fast Violet AL...	By	A269

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Helio Fast Yellow 8 GL....	By	A270	Indanthrene NN.....	B	873a
Helio Red RM.....	By	A271	Indanthrene Black.....	B	768a
Helio Red RMT.....	By	A272	Indanthrene Black B, BB..	B	768a
Heliotrope 2 B.....	A,L,By	321	Indanthrene Blue 3 G.....	B	840
Hessian Brilliant Purple....	L	302	Indanthrene Blue GC.....	B	843
Hessian Brown BBN.....	L	489	Indanthrene Blue GCD.....	B	842
Hessian Fast Red F.....	L	343	Indanthrene Blue GGS, GCSL.....	B	841
Hessian Purple N.....	By, L	301	Indanthrene Blue GG, SP..	B	841
Hessian Yellow.....	L	305	Indanthrene Blue 3 GP.....	B	840
Hoffmans Violet.....	P	514	Indanthrene Blue R.....	B	837
Homophosphine G.....	L	609	Indanthrene Blue RS.....	B	838
Homophosphine OO.....	L	609	Indanthrene Blue WB.....	B	850
Hydranthrene Brilliant Cop- per D.....	...	813	Indanthrene Blue WR.....	B	850a
Hydranthrene Dark Blue....	...	763	Indanthrene Blue Green B..	B	765a
Hydranthrene Olive R.....	...	791	Indanthrene Bordeaux B.....	B	828
Hydranthrene Yellow AG, AR.....	...	849	Indanthrene Bordeaux B extra.....	B	827
Hydrazine Yellow OO.....	GrE	A462	Indanthrene Brown.....	B	867
Hydrazine Yellow SO.....	GrE	A463	Indanthrene Brown B.....	B	867
Hydrazol Black.....	AW	A603	Indanthrene Claret B.....	B	828
Hydrazol Black R.....	AW	A604	Indanthrene Claret R extra..	B	827
Hydrazol Chrome Black CB	AW	A605	Indanthrene Copper R.....	B	813
Hydrazol Chrome Black DB	AW	A606	Indanthrene Dark Blue BD	B	763
Hydron Blue (V. M.).....	C	748	Indanthrene Dark Blue BO	B	763
Hydron Blue G, R.....	...	748a	Indanthrene Dark Blue BT	B	846
Hydron Brown (V. M.).....	C	748a	Indanthrene Fast Blue RR..	B	837a
Hydron Olive G.....	C	748b	Indanthrene Gold Orange G	B	760
Hydron Violet.....	C	748c	Indanthrene Gold Orange R	B	761
Hydron Yellow G.....	C	748d	Indanthrene Gold Orange RS	B	761
Hylidine Ponceau 2 R.....	G	U627	Indanthrene Gold Orange 2 RT.....	B	761
Hylidine Ponceau 2 R.....	tM	U532	Indanthrene Gray B, BP.....	B	848
Immedial Blue (V. M.).....	C	724	Indanthrene Green B.....	B	765
Immedial Blue (V. M.).....	C	724a	Indanthrene Maroon R.....	B	845
Immedial Bordeaux G.....	C	739	Indanthrene Olive G.....	B	791
Immedial Brilliant Black B	C	720	Indanthrene Orange RT.....	B	812
Immedial Brilliant Carbon F, FG.....	C	720	Indanthrene Pink B.....	B	873b
Immedial Brilliant Green G.	C	S69	Indanthrene Red BN.....	B	831
Immedial Brown (V. M.)....	C	725	Indanthrene Red G.....	B	826
Immedial Carbon (V. M.)...	C	720	Indanthrene Red R.....	B	830
Immedial Cutch.....	C	S70	Indanthrene Red Brown R..	B	873c
Immedial Cutch (V. M.)....	C	S71	Indanthrene Red Violet RRN	B	873d
Immedial Dark Brown (V. M.).....	C	725	Indanthrene Scarlet G, GS..	B	762
Immedial Dark Green B.....	C	S73	Indanthrene Violet B.....	B	768
Immedial Deep Green G.....	C	S74	Indanthrene Violet R.....	B	766
Immedial Direct Blue(V.M.)	C	S75	Indanthrene Violet RN.....	B	832
Immedial Green (V. M.)....	C	746	Indanthrene Violet Rlt.....	B	767
Immedial Green Blue.....	C	746	Indanthrene Violet RT.....	B	764
Immedial Indigene (V.M.)...	C	S76	Indanthrene Violet Yellow G, P.....	B	849a
Immedial Indone (V. M.)...	C	733	Indanthrene Yellow G, GP..	B	849
Immedial Indone Violet B..	C	733a	Indazine M.....	C	689
Immedial Khaki.....	C	S77	Indazurine B.....	I	414
Immedial Maroon B.....	C	730	Indazurine BB.....	I	420
Immedial New Blue G.....	C	S78	Indazurine GM.....	I	427
Immedial Olive (V. M.)....	C	S79	Indazurine 5 GM.....	I	430
Immedial Orange C, N.....	C	711	Indazurine RM.....	I	396
Immedial Purple C.....	C	S80	Indazurine TS.....	I	399
Immedial Sky Blue.....	C	728	India Rose 17285.....	I	U667
Immedial Violet C.....	C	S81	Indian Red.....	G	U628
Immedial Yellow (V. M.)...	C	710	Indian Yellow (V.M.)....	C	141b
Immedial Yellow Olive (V. M.).....	C	S82	Indian Yellow G, GN.....	By	141
Imperial Green GI.....	By	A273	Indian Yellow R.....	By	140
Imperial Scarlet 3 B.....	By	247	Indigene R.....	AW	697
Imperial Yellow R.....	By	7b	Indigene Blue BB.....	I	A701
Indalizarin I, J, R.....	DH	633	Indigene Blue lt.....	I	A702
Indalizarin Green.....	DH	634	Indigo.....	Var	874
Indamine 3 R.....	CG	704	Indigo paste.....	Var	874
Indamine 6 R.....	CG	705	Indigo powder.....	Var	874
Indamine Blue.....	M	696	Indigo solution.....	M	874
Indanthrene.....	B	837	Indigo FBP.....	By	874
			Ind go G.....	B	888



Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Indigo 7 G.....	By	874	Janus Yellow.....	...	221
Indigo KB paste.....	K	881	Janus Yellow G.....	M	222
Indigo KG.....	K	883	Japan Black.....	B	U145
Indigo MLB.....	M	874	Japan Black B.....	B	U146
Indigo MLB 2 B.....	M	880	Japan Black M.....	B	U148
Indigo MLB 4 B.....	M	881	Japan Black MBG.....	B	U149
Indigo MLB 5 B.....	M	882	Japan Black MF.....	B	U150
Indigo MLB 6 B.....	M	883	Jasmine.....	G	U629
Indigo MLBR, MLBRR.....	M	879	Jasmine high conc.....	G	140
Indigo MLBT.....	M	888	Jaune Métanile Bromé.....	P	135
Indigo MLB Vat I.....	M	876	Jet Black APX.....	B	U151
Indigo NC.....	By	880	Jet Black R.....	By	262
Indigo RB.....	B	888	Jet Black RR.....	B	U152
Indigo T.....	...	888	Jute Black B.....	By	U153
Indigo Acid Blue A.....	Q	545	Jute Black I.....	tM	U533
Indigo Blue N.....	C	874	Jute Black RNT.....	B	U153
Indigo Blue 275.....	CJ	874	Jute Coal Black S.....	By	U154
Indigo Carmine Blue BG.....	A	U23	Katigene Black (V. M.).....	By	720
Indigo Extract A, AN 4.....	B	877	Katigene Black Brown BW.....	By	S39
Indigo Salt T.....	K	875	Katigene Black Brown GN.....	By	S40
Indigo Yellow 3 G.....	I	889	Katigene Black Brown R.....	By	S41
Indigo White.....	B	876	Katigene Blue Black 4 BPA.....	By	720
Indigotine.....	Var	877	Katigene Brilliant Black B, FG.....	By	720
Indigotine P.....	B	878	Katigene Brilliant Green 3 G.....	By	S43
Indigotine 500.....	A	877	Katigene Brown 2 R.....	By	S45
Indo Carbon.....	C	743	Katigene Brown V.....	By	S46
Indochromine.....	...	667	Katigene Chrome Blue 5 G.....	By	S47
Indochromine RR, T.....	S	667	Katigene Cutch B.....	By	S48
Indochromine Black EXD.....	S	667a	Katigene Deep Black B.....	By	720
Indochromogen S.....	...	666	Katigene Direct Blue B.....	By	S49
Indocyanine B, 2 RF.....	A	705a	Katigene Direct Blue RF.....	By	S50
Indocyanine B.....	G	699c	Katigene Green.....	By	746
Indoine.....	WD	126	Katigene Green 2 B, 4 B, 2 G, MK.....	By	746
Indoine Blue.....	Sch	126	Katigene Indigo.....	By	S51
Indoine Blue R.....	B	126	Katigene Indigo B.....	By	S52
Indophenol.....	DH	619	Katigene Indigo G.....	By	S53
Indo Violet BF.....	A	U24	Katigene Indigo 3 GT.....	By	S54
Induline.....	Var	699	Katigene Khaki G.....	By	S55
Induline.....	Var	697	Katigene Olive GN.....	By	S56
Induline B.....	By	699	Katigene Olive Brown R.....	By	S57
Induline 2 B.....	CJ	699	Katigene Red Brown R.....	By	S58
Induline BA.....	P	697	Katigene Red Brown 3 R.....	By	S59
Induline DB, N.....	tM	699	Katigene Violet B.....	By	S60
Induline NN.....	B	699	Katigene Violet 3 R.....	By	S61
Induline NBL.....	By	699	Katigene Yellow G.....	By	S62
Induline RN.....	K	699	Katigene Yellow GG.....	By	S63
Induline S.....	I	697	Katigene Yellow GR.....	By	S64
Induline WLX.....	B	699	Katigene Yellow Brown GG.....	By	S65
Induline 1768, 1778.....	K	699	Katigene Yellow Brown GR.....	By	S66
Induline 10350.....	I	697	Katigene Yellow Brown 9 R.....	By	S67
Induline 38724, 38725.....	H	699	Katigene Yellow Brown RL.....	By	S68
Induline Black base 5789.....	K	700	Ketone Blue 4 BN.....	M	547
Induline Red (V. M.).....	K	699a	Ketone Blue Violet 10 B.....	I	528
Induline Scarlet (Iris Blue).....	B	671	Kilton Blue N.....	I	U608
Induline Spirit Soluble.....	Var	697	Kilton Blue V.....	I	543
Induline Water Soluble.....	Var	699	Kilton Fast Green V.....	I	564
Ingrain Black.....	H	A759	Kilton Fast Orange G.....	I	U669
Ingrain Black 4 B.....	H	A758	Kilton Red 6 B.....	I	U672
Ink Blue BJTBNOO.....	GrE	U509	Kilton Red G.....	I	U673
Ink Blue BJTNO.....	GrE	U509	Kilton Red Violet 10 B.....	I	528
Ink Blue BNOO.....	GrE	U509	Kilton Violet 12 B.....	I	U674
Intensive Blue B.....	By	562	Kilton Fast Yellow 3 G.....	I	U670
Iris Blue.....	B	648	Kilton Fast Yellow R.....	I	U671
Irisamine.....	C	576	Kilton Yellow G.....	I	U675
Irisamine G.....	C	576	Kilton Yellow GG.....	I	U676
Irisamine G ex.....	S	576	Kraft Brown L.....	B	U155
Isamine Blue (V. M.).....	C	U288	Kraft Brown basic YZ.....	B	U155
Isodiphenyl Black R.....	G	437	Kryogene Black BNX.....	B	755
Isopurpurin.....	...	784	Kryogene Black TBO, TG.....	B	720
Italian Green.....	...	709	Kryogene Black TGE, TGO.....	B	720
Janus Brown B.....	M	435	Kryogene Black TGO.....	B	756
Janus Gray B.....	M	128			
Janus Red B.....	M	240			

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Kryogene Blue BNO.....	B	753	Lemon Yellow R.....	K	U360
Kryogene Brown A.....	B	743	Leuco-Gallo Thionine DH..	DH	664
Kryogene Brown A, G.....	B	750	Leucol Dark Green B.....	By	866
Kryogene Brown GX.....	B	750	Leucol Brown B.....	By	872
Kryogene Brown R B, RBNXX.....	B	751	Light Blue.....	tM	521
Kryogene Brown RXX.....	B	751a	Light Blue G.....	tM	539
Kryogene Direct Blue B.....	B	753	Light Blue Superfine Spirit Soluble.....	M	520
Kryogene Direct Blue 3 B.....	B	754	Light Green A ex conc.....	tM	503
Kryogene Direct Blue BNAGX.....	B	753	Light Green 2 A.....	tM	518
Kryogene Direct Blue G, GO	B	752	Light Green 2 G conc.....	B	505
Kryogene Green GX.....	B	754a	Light Green SF.....	B	504
Kryogene Pure Blue R.....	B	729	Light Green SF.....	B	505
Kryogene Red Brown GRXX	B	751b	Light Green SF Bluish.....	B	504
Kryogene Violet 3 RX.....	B	754b	Light Green SF Yellowish..	B	505
Kryogene Yellow.....	B	712	Light Green SF Yellowish..	Q	505
Kryogene Yellow G, GG.....	B	712	Light Green SL.....	B	505
Kryogene Yellow R.....	B	716	Light Green Yellowish.....	B	505
Laquer Black R.....	A	U25	Lilac PC.....	DH	U599
Lake Black C.....	C	U289	Lilac PC.....	G	U631
Lake Black P.....	C	U630	Liquid Oil Black N.....	tM	U536
Lake Blue ABII.....	M	U443	Lissome Green.....	H	506
Lake Blue ABOII.....	M	U444	Lithol Claret B.....	B	A80
Lake Blue AV.....	M	U445	Lithol Fast Orange R.....	B	A82
Lake Blue AVO.....	M	U446	Lithol Fast Scarlet B, G, RN	B	73a
Lake Blue I.....	B	U156	Lithol Fast Scarlet R.....	B	73
Lake Blue RT.....	BK	U483	Lithol Red 3 B, GG, 3 G.....	B	173a
Lake Bordeaux B.....	M	179	Lithol Red R.....	B	173
Lake Purple 3 P.....	B	U157	Lithol Red RG, RS.....	B	173a
Lake Red.....	Var	153	Lithol Rubine B, BN, G, RG	B	152
Lake Red C.....	M	153	Magenta.....	Var	512
Lake Red D.....	M	200	Magenta A.....	B	512
Lake Red F.....	M	132	Magenta AB.....	B	512
Lake Scarlet.....	C	A377	Magenta B.....	C	512
Lake Scarlet Red D.....	M	A435	Magenta FABS.....	H	512
Lake Yellow 28227.....	By	U247	Magenta L, S.....	B	512
Lanacyl Blue B, BB.....	C	187	Magenta TP.....	tM	512
Lanacyl Violet B, BF.....	C	186	Magenta (acetate).....	B	512
Lanafuchsine (V. M.).....	C	64	Magenta crystals.....	Var	512
Leather Black (V. M.).....	C	U290	Magenta crystals.....	tM	512
Leather Black BO.....	B	U158	Magenta crystals II.....	tM	512
Leather Black CR.....	B	U159	Malachite Green.....	Var	495
Leather Black I.....	I	U677	Malachite Green (V. M.).....	Var	495
Leather Black.....	K	U358	Malachite Green Basic.....	Var	495
Leather Black R.....	tM	U535	Marine Blue B.....	I	537
Leather Black T.....	M	U447	Marine Blue RR.....	tM	U537
Leather Black 3553.....	GrE	U511	Maroon.....	By	512
Leather Brown.....	GrE	208	Marron Cordu.....	Q	512
Leather Brown.....	K	U359	Mars Red AX, GX.....	B	163
Leather Brown GG.....	By	U248	Martius Yellow.....	A, BK	6
Leather Brown LX.....	Lev	283a	Martius Yellow 741.....	G	6
Leather Brown R.....	I	283a	Martius Yellow 6749.....	BK	6
Leather Flavine 9118.....	I	606g	Mauve.....	P, etc.	688
Leather Flavine 9118.....	S	606g	Melanogene Blue.....	M	745
Leather Gold 5902.....	BK	U484	Melantherine BH.....	I	333
Leather Olive 71930.....	A	U26	Melantherine IH.....	I	333c
Leather Orange.....	Sch	211	Melantherine RO.....	I	328
Leather Orange B.....	Lev	U738	Melantherine 11818, 12760..	I	333c
Leather Orange BY.....	Lev	U739	Melantherine Black BH.....	I	333
Leather Red O.....	M	U448	Meldola's Blue.....	...	640
Leather Yellow A.....	GrE	606	Meldola's Blue 3 R.....	S	640
Leather Yellow FG, FU.....	Q	606	Melogene Blue BH.....	S	438
Leather Yellow G.....	Var	606	Mercerine Wool Scarlet 5 B	H	U756
Leather Yellow 2 G, 3 G.....	CG	606	Mercerol Brown 3 R.....	H	U754
Leather Yellow GC, GS, M.....	GrE	606	Mercerol Orange 2 R.....	H	U755
Leather Yellow GN.....	AW	606	Meridian Black AE.....	S	U708
Leather Yellow NL.....	BK	606	Meridian Black AN.....	S	U709
Leather Yellow O.....	M	606	Metachrome Blue B.....	A	U27
Leather Yellow P.....	tM	606	Metachrome Blue G.....	A	U28
Leather Yellow R, TG.....	Q	606	Metachrome Blue Black 2 B	A	U29
Leather Yellow TBR.....	tM	606	Metachrome Blue Black 2 BX	A	U30
Leather Yellow 5828a.....	L	606	Metachrome Bordeaux R.....	A	92
			Metachrome Brown B.....	A	89

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Metachrome Brown BL...	A	U31	Methylene Blue D.....	I	659
Metachrome Brown BRL...	A	U32	Methylene Blue DBBM,		
Metachrome Olive B.....	A	A25	DDBM.....	M	659
Metachrome Olive Brown G	A	A26	Methylene Blue FKII.....	K	659
Metachrome Orange R.....	A	58	Methylene Blue G.....	I	659
Metachrome Orange 3 R....	A	U33	Methylene Blue HGG.....	B	659
Metachrome Red G.....	A	U34	Methylene Blue L.....	K	659
Metachrome Violet B.....	A	U35	Methylene Blue MD.....	B	659
Metachrome Violet 2 R....	A	U36	Methylene Blue MDX.....	B	659
Metachrome Yellow RA....	A	A27	Methylene Blue MEDZ....	M	659
Metamine Brown.....	S	U710	Methylene Blue MNX.....	B	663
Metanil Yellow.....	Var	134	Methylene Blue 3 R.....	M	659
Metanil Yellow (V. M.)....	Var	134	Methylene Blue S.....	CR	659
Metanil Yellow Brominated	P	135	Methylene Blue VN.....	B	603
Metanil Red 3 B.....	By	A274	Methylene Blue 15746....	P	659
Meta-Nitraniline Orange..	M	46	Methylene Blue 52067....	tM	659
Meta-phenylene Blue B, 2 B	C	601	Methylene Gray ND, O....	M	681
Meta-phenylene Blue R....	C	600	Methylene Green.....	K, S	660
Methyl Alkali Blue.....	B, etc.	535	Methylene Green B, BX....	B	660
Methyl Alkali Blue Pure...	I	535	Methylene Green BX.....	K	660
Methyl Blue.....	tM	537	Methylene Green G.....	S	660
Methyl Blue.....	A, C	538	Methylene Green N, O....	M	660
Methyl Blue MBS.....	GrE	537	Methylene Green P.....	G, I	660
Methyl Blue for silk.....	GrE, M	537	Methylene Green T, W....	C	660
Methyl Eosine.....	B	588	Methylene Green 247....	K	660
Methyl Gallus Blue.....	G	U632	Methylene Heliotrope O...	M	687
Methyl Green.....	P, etc.	519	Methylene SZO.....	DH	659
Methyl Indone B.....	C	127	Methylene Violet.....	Var	680
Methyl Lyons Blue.....	G	537	Methylene Violet B.....	DH	680
Methyl Orange.....	tM, etc.	138	Methylene Violet BN.....	M	680
Methyl Silk Blue (new)....	G	537	Methylene Violet 2 R....	H	680
Methyl Soluble Blue 3 S...	B, etc.	U160	Methylene Violet 3 RA....	K	680
Methyl Violet.....	Var	515	Methylene Yellow H.....	M	618
Methyl Violet B.....	Var	515	Mikado Brown 2 B, M....	L	11
Methyl Violet BB.....	Var	515	Mikado Golden Yellow 6 G,		
Methyl Violet 3 B.....	tM	515	8 G.....	L	10
Methyl Violet 4 B.....	M, tM	515	Mikado Orange (V. M.)....	L, etc.	11
Methyl Violet 5 B.....	By, etc.	517	Mikado Orange 4 RC.....	A	11
Methyl Violet 5 B.....	tM	515	Mikado Orange 4 RO.....	A, L	11
Methyl Violet 6 B.....	B	517	Mikado Yellow.....		10
Methyl Violet 6 B.....	M	515	Milling Blue.....	K	693
Methyl Violet 7 B.....	By, tM	517	Milling Blue BC.....	K	
Methyl Violet base 7 B....	BK	517	Milling Blue GR.....	A	U 37
Methyl Violet B-BBM.....	M	515	Milling Blue 2 R.....	M	A436
Methyl Violet 3 BHN.....	tM	515	Milling Blue 5 R.....	A	U38
Methyl Violet BIA, 2 BIA..	tM	515	Milling Brown G.....	L	U521
Methyl Violet 2 BP, 3 BIA,			Milling Brown BW.....	L	503
5 BIA.....	tM	515	Milling Green DB, DS....	AW	523b
Methyl Violet 2 BN, 6 BN..	tM	515	Milling Orange.....	WD	250
Methyl Violet 4 BOOATN...	GrE	515	Milling Orange G.....	A	U39
Methyl Violet DB.....	tM	515	Milling Orange G.....	By	A275
Methyl Violet IB, IBA.....	By	515	Milling Orange JN.....	WD	250
Methyl Violet N, NY 147...	B	515	Milling Orange RO.....	L	58
Methyl Violet R, 3 R.....	M, tM	515	Milling Orange 88.....	WD	250
Methyl Violet 5 R.....	Var	515	Milling Red.....	A	U40
Methyl Violet 5 RA.....	tM	515	Milling Red G.....	C	293
Methyl Violet RIA.....	tM	515	Milling Red 4 BA.....	A	493
Methyl Violet 5 RO.....	B	515	Milling Red 6 BA.....	A	U41
Methyl Violet 129.....	K	515	Milling Red GA.....	A	U42
Methyl Violet base.....	B	515	Milling Red R.....	WD	298
Methyl Violet base BB.....	K	515	Milling Scarlet B, G....	M	400b
Methyl Violet base 74418..	H	515	Milling Scarlet BS.....	CICo	484
Methylene Blue.....	Var	659	Milling Scarlet 4 R.....	M	400
Methylene Blue AN, BB....	B	663	Milling Yellow (V. M.)....	C	A378
Methylene Blue B.....	Var	659	Milling Yellow 3 G.....	A	U43
Methylene Blue 2 B.....	Var	659	Milling Yellow GA.....	A	U44
Methylene Blue BA.....	tM	659	Milling Yellow 3 GO.....	CV	177
Methylene Blue BEX.....	B	659	Milling Yellow H, HG, H 3G	M	177c
Methylene Blue 2 BD.....	A	659	Mimosa.....	G	198
Methylene Blue BG.....	B	659	Mimosa C, R, Z, 2.....	G	198
Methylene Blue BG.....	tM	659	Mineral Blue.....	C	U291
Methylene Blue BGN.....	B	659	Modern Azurine DH.....	DH	640
Methylene Blue BX.....	A	659	Modern Blue.....	DH	629

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Modern Cyanine.....	DH	627	Naphthogene Blue B.....	A	A28
Modern Violet.....	DH	635	Naphthogene Blue 2 R.....	A	A29
Modern Violet N.....	DH	624	Naphthogene Blue 4 R.....	A	A30
Monochrome Black F.....	By	U249	Naphthogene Blue 6 R.....	A	A31
Monochrome Black Blue G.....	By	U250	Naphthogene Indigo Blue R.....	A	U45
Monochrome Blue 5 R.....	By	U251	Naphthogene Pure Blue 4 B.....	A	U46
Monochrome Brown BX.....	By	U252	Naphthol Black (V. M.).....	C	272a
Monochrome Brown G.....	By	U253	Naphthol Black (V. M.).....	K	269a
Monochrome Brown V.....	By	U254	Naphthol Black A.....	K	269a
Mordant Blue 13707.....	I	A703	Naphthol Black B.....	C	272
Mordant Yellow GD, GS, R.....	B	177	Naphthol Black 2 B.....	By	269d
Mordant Yellow GTS.....	B	48	Naphthol Black 3 B.....	CV	272a
Mordant Yellow O.....	M	177	Naphthol Black 6 B.....	C, K	269
Mordant Yellow 3 R.....	B	58	Naphthol Black BR.....	tM	269
Muscarsine.....	DH	655	Naphthol Black CR, MB, N, TR.....	K	269a
Nako Blue Black B.....	M	923a	Naphthol Black greenish.....	K	296a
Nako Black DBB, O.....	M	923a	Naphthol Blue.....	C	A379
Nako Brown B, DR, 3 GA.....	M	923a	Naphthol Blue 2 R.....	tM	649
Nako Brown 3 GN, P, RH.....	M	923a	Naphthol Blue Black (V.M.).....	Var	217
Nako Gray B, 6 B.....	M	923a	Naphthol Blue Black M.....	By	217
Nako Yellow O.....	M	923a	Naphthol Blue Black 6 B.....	BK	217
Nankin.....	tM	606g	Naphthol Dark Green G.....	C	U202
Naphthalene Acid Black 4 B.....	By	258	Naphthol Green.....	tM	4
Naphthalene Black D.....	H	U758	Naphthol Green B.....	By, C	4
Naphthalene Black 12 B.....	II	217	Naphthol Orange.....	Var	144
Naphthalene Blue B.....	M	A437	Naphthol Pink.....		98
Naphthalene Blue DL.....	M	A438	Naphthol Red (V.M.).....	C	168
Naphthalene Green.....	M, I	504	Naphthol Red GR.....	B	166
Naphthalene Green V.....	M, I	504	Naphthol Red S.....	B	168
Naphthamine Black RE.....	K	335	Naphthol Yellow.....	I	7
Naphthamine Blue (V. M.).....	K	338	Naphthol Yellow S.....	Var	7
Naphthamine Blue 2 B, 3 B.....	K	338	Naphthol Yellow SE.....	B, By	7
Naphthamine Brilliant Blue G.....	K	379a	Naphthol Yellow SLC, SLZ.....	M	7
Naphthamine Brilliant Blue 3.....	K	379a	Naphthylamine Black D.....	C, K	266
Naphthamine Brown.....	K	477a	Naphthylamine Black (V.M.).....	C, K	266
Naphthamine Brown 4 G.....	K	477	Naphthylamine Black 4 AN, 4 B.....	By	217d
Naphthamine Deep Black HW.....	K	335a	Naphthylamine Black 10 B.....	By	217
Naphthamine Direct Black (V. M.).....	K	458	Naphthylamine Black 4 BK.....	By	217d
Naphthamine Direct Blue BXR.....	K	A399	Naphthylamine Red 3 BM.....	B	168a
Naphthamine Direct Blue ER.....	K	A399	Naphthylamine Black B 2 N.....	K	266a
Naphthamine Direct Blue 2 R, 3 R.....	K	A399	Naphthylamine Black 6 BN.....	By	217d
Naphthamine Direct Blue 3692.....	K	A399	Naphthylamine Black BOO.....	K	266a
Naphthamine Direct Green AG.....	K	A400	Naphthylamine Black 4 BX.....	B	266a
Naphthamine Fast Black (V. M.).....	K	U362	Naphthylamine Black CSR, CSB.....	By	217d
Naphthamine Fast Black KS.....	K	U361	Naphthylamine Black F.....	By	217d
Naphthamine Fast Bordeaux BG.....	K	U363	Naphthylamine Black NA.....	K	266a
Naphthamine Fast Scarlet (V. M.).....	K	U364	Naphthylamine Black NSBN.....	K	266a
Naphthamine Green (V.M.).....	K	A401	Naphthylamine Black SX.....	B	266a
Naphthamine Orange (V.M.).....	K	A402	Naphthylamine Black 2002, 2003.....	K	266a
Naphthamine Red 3605 H.....	K	343	Naphthylamine Blue Black.....	C	A380
Naphthamine Scarlet.....	K	U365	Naphthylamine Blue 2 B.....	K	338
Naphthamine Violet BE.....	K	326	Naphthylamine Blue 3 B.....	K	338
Naphthamine Violet R.....	K	327b	Naphthylamine Brown.....	B	160
Naphthamine Yellow (V.M.).....	K	9a	Naphthylamine Green T.....	By	A276
Naphthamine Yellow R, X.....	K	9a	Naphthylamine Sky Blue DD.....	NF	A530
Naphthazine Blue.....	WD	602	Naphthylamine Yellow.....	K	6
Naphthazine Navy Blue 156.....	WD	602a	Naphthyl Blue Black NI.....	C	268
Naphthazurine B, BA.....	GrE	383	Naphthylene Violet.....	C	432
Naphthazurine 3703.....	K	383	Navy Blue.....	C	A381
Naphthochrome Violet R.....	I	U678	Navy Blue D.....	I, S	537a
Naphthoform Black 3930.....	K	U366	Navy Blue F.....	AW	537
			Navy Blue GR, 5 R.....	CV	537a
			Navy Blue 17184.....	K	U367
			Navy Blue SM.....	P	537a
			Navy Blue T.....	AW	537
			Neotolyl Black B.....	M	U450
			Neotolyl Black BB.....	M	U451
			Neotolyl Black 4 B.....	M	U452
			Neotolyl Black TL.....	M	U453

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Neotolyl Black VL.....	M	U454	Night Green A.....	tM	503
Neptune Blue B.....	B	545	Nigramine.....	CG	682
Neptune Blue BG, BGN, BGX.....	B	543	Nigrophor.....	B	218
Neptune Blue BR, BTE, R	B	545a	Nigrosine.....	Var	698
Neptune Blue BXX.....	B	545	Nigrosine.....	Var	700
Neptune Brown RX.....	B	U161	Nigrosine (V. M.).....	Var	698
Neptune Green.....	B	503	Nigrosine (V. M.).....	Var	700
Neptune Green SAX, SBL, SGX.....	B	503	Nigrosine spirit soluble.....	Var	698
Nerazine (V. M.).....	C	U293	Nigrosine, water soluble.....	Var	700
Nerol B.....	A	A32	Nigrosines from aniline (in- dulines).....	Sch	699
Nerol 2 B.....	A	A33	Nigrosines from nitrobenzol	Sch	700
Nerol BL.....	A	A34	Nile Blue A, B, R.....	B	653
Nerol 2 BL.....	A	A35	Nile Blue 2 B.....	B	654
Nerol VL.....	A	A36	m-Nitraniline Orange.....	M	46
Neutral Blue.....	C	676	Nitro Azomine Green F.....	CV	A730
Neutral Blue R.....	AW	676	Nitrophenine.....	CICo	51
Neutral Blue 3 R.....	M	U455	Nitrosamine Pink BXX.....	B	98
Neutral Gray.....	...	221	Nitroso Blue MR.....	M	647
Neutral Gray G.....	A	241	Nitrosamine Red.....	B	56
Neutral Red.....	C	670	Nyanza Black B.....	A	245
Neutral Violet.....	C	669	Oil Black (V. M.).....	CJ	U495
Neutral Violet O.....	M	U456	Oil Black (V. M.).....	K	U369
New Acid Chrome Black R.	AW	A607	Oil Black 6 B.....	B	U163
New Chrome Black PK.....	CV	275a	Oil Black 6 G.....	B	U164
New Blue B, G.....	C, etc.	650	Oil Black HG.....	B	U165
New Blue R.....	Var	649	Oil Black 11410, 39694.....	H	U759
New Blue RR, RG.....	B	649	Oil Blue.....	B	U166
New Claret B.....	B	A83	Oil Blue Black 114.....	K	U370
New Claret P.....	B	A85	Oil Brown BG.....	K	U371
New Claret R.....	B	A86	Oil Color Brown.....	H	U760
New Cocaine.....	A	169	Oil Color Canary.....	H	U761
New Direct Blue S.....	K	U368	Oil Color Yellow.....	H	U762
New Ethyl Blue BS.....	M	U457	Oil Orange.....	Var	36
New Ethyl Blue RS.....	M	U458	Oil Orange (V. M.).....	K	U372
New Fast Blue F, H.....	By	652	Oil Orange AR.....	K	U372
New Fast Blue R, RS.....	I	652a	Oil Orange LG.....	I	36a
New Fast Gray.....	By	681	Oil Orange R.....	B	U167
New Fast Green 2 B.....	I	497	Oil Orange 3 R.....	B	U168
New Fast Pink F.....	By	652	Oil Orange 2311.....	Sch	36
New Fast Straw Yellow.....	AW	A608	Oil Red (V. M.).....	K	U373
New Fuchsine O.....	M	513	Oil Red B.....	B	U169
New Fuchsine S.....	GrE	513	Oil Red G.....	B	U170
New Magenta O.....	GrE	513	Oil Red 7327.....	CJ	U496
New Magenta O.....	M	512	Oil Yellow.....	Var	32
New Methylene Blue (V.M.)	C	663	Oil Yellow (V. M.).....	K	U374
New Methylene Blue F.....	By	663	Oil Yellow A.....	Sch	31
New Methylene Blue GG.....	C	651	Oil Yellow G.....	B	U171
New Methylene Blue NNX.....	B	663	Oil Yellow R.....	B	U172
New Nigrosine.....	AW	700	Oil Yellow 2338.....	Sch	36a
New Patent Blue B.....	By	563	Oil Yellow 2625.....	Sch	32
New Patent Blue GA.....	By	545b	Oil Yellow 2681.....	Sch	68
New Phosphine G.....	C	75	Oil Yellow 7869.....	I	32a
New Polychromine FB.....	G	616	Old Gold.....	Q	U804
New Toluylene Brown OO.....	GrE	A465	Oleate Green O.....	Q	U805
New Toluylene Brown O.....	GrE	A464	Omega Chrome Cyanine R.	SS	U711
New Toluylene Brown R.....	GrE	A466	Omega Chrome Red B.....	SS	U712
New Victoria Black B.....	By	262	Omega Chrome Black PV.....	S	85
New Victoria Blue B.....	By	558	Opal Blue.....	M	521
New Yellow for Cotton.....	WD	304	Opaline Blue R.....	I	U679
Niagara Black Blue R.....	Sch	441	Orange A.....	Sch	145
Niagara Blue B, 2 B.....	Sch	337	Orange D.....	B	37a
Niagara Blue 4 B.....	Sch	426	Orange G.....	Var	38
Niagara Blue 6 B.....	Sch	424	Orange G.....	K	139a
Niagara Blue BR.....	Sch	386	Orange 2 G.....	H	38
Niagara Blue GW, HW, RW	Sch	336	Orange GC.....	K	139a
Niagara Blue R.....	Sch	326	Orange GD.....	L	144a
Niagara Fast Red FD.....	Sch	343	Orange GRX.....	B	37
Niagara Violet 2 B.....	Sch	326	Orange GS.....	H	139
Niagara Violet 3 R.....	Sch	327	Orange GT.....	By	70
Nicholson Blue 4 B.....	P	536	Orange N.....	I	139
Night Blue.....	B, I, S	560	Orange NA.....	GrE	79a
			Orange PC.....	DH	145a

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Orange R.....	Var	151	Oxamine Light Green 3 G..	B	A119
Orange 2 R.....	K	139a	Oxamine Maroon.....	B	345
Orange RO.....	B	151a	Oxamine Pure Blue 6 B, 6 BO, 6 BXX.....	B	424
Orange RO.....	By	A277	Oxamine Red.....	B	346
Orange S.....	B	144	Oxamine Red 3 B, BNX....	B	346
Orange T.....	K, tM	151	Oxamine Violet.....	B	326
Orange TA.....	A, etc.	311	Oxamine Yellow A.....	B	A120
Orange X.....	H	37a	Oxamine Yellow 3 G.....	B	A121
Orange I.....	Var	144	Oxy Acid Red 6 BO.....	GrE	U512
Orange II.....	Var	145	Oxy Chlorazol Blue B....	H	A760
Orange III.....	P	47	Oxy Diamine Black (V.M.)	C	A382
Orange IV.....	Var	139	Oxy Diamine Blue (V.M.)	C	A383
Orange 13.....	S	58c	Oxy Diamine Brown (V.M.)	C	A384
Orange 14.....	S	58c	Oxy Diamine Carbon (V.M.)	C	A385
Orange 67 (V. M.)....	C	38	Oxy Diamine Orange (V.M.)	C	362
Orange 227.....	Q	36b	Oxy Diamine Red S.....	C	A386
Orange 23981.....	S	58c	Oxy Diamine Violet (V.M.)	C	326
Orange Crystals.....	AW	38	Oxy Diamine Yellow.....	C	198
Orange Crystals 2 G..	WD	38	Oxy Diaminogen (V.M.)...	C	A387
Orange Red pure.....	A	174	Oxychrome Black F.....	GrE	A467
Oreil RCEP.....	A	U48	Oxychrome Blue Black BGO	GrE	A468
Oreil OPAG.....	A	U47	Oxychrome Brown V.....	GrE	A469
Oreil RPH.....	A	U49	Oxychrome Brown VA.....	GrE	A470
Oriol Yellow.....	G	199	Oxychrome Brown VN.....	GrE	A471
Oriol Yellow EC.....	G	199	Oxychrome Yellow D.....	GrE	A472
Orselline BV.....	By	253	Oxychrome Yellow DG.....	GrE	A473
Ortho Black 3 B.....	A	A37	Oxychrome Yellow 2 G....	GrE	A474
Ortho Cyanine B.....	A	A38	Oxyphenine A, C, GG, R...	ClCo	617
Ortho Cyanine 6 G....	A	A39	Pacific Blue.....	H	540
Oxamine Acid Brown G..	B	A87	Palatine Black A, 4 B....	B	220
Oxamine Black A.....	B	A88	Palatine Black 3 GX, MZ, SF, STM.....	B	220
Oxamine Black BB.....	B	A89	Palatine Chrome Black....	B	288
Oxamine Black BHN, BHX	B	333	Palatine Chrome Black 6 B, 6 BX.....	B	181
Oxamine Black BBNX....	B	A90	Palatine Chrome Black F...	B	288
Oxamine Black BRTX....	B	A91	Palatine Chrome Black S...	B	289
Oxamine Black RN.....	B	A92	Palatine Chrome Blue BB...	B	A122
Oxamine Blue.....	B	421	Palatine Chrome Blue W 2 B	B	A123
Oxamine Blue A, AX....	B	410	Palatine Chrome Brown 5 G	B	154a
Oxamine Blue B.....	B	421	Palatine Chrome Brown	B	154a
Oxamine Blue 3 B, BG, GNX, 3 R.....	B	421a	GGTX.....	B	154a
Oxamine Blue 4 R.....	B	385	Palatine Chrome Brown	B	154a
Oxamine Brilliant Red BX	B	A93	GGX, R.....	B	154
Oxamine Brilliant Violet RX	B	A94	Palatine Chrome Brown W.	B	154
Oxamine Brown A.....	B	A95	Palatine Chrome Brown WN	B	154
Oxamine Brown G.....	B	A96	Palatine Chrome Brown	B	154
Oxamine Brown 3 G....	B	A97	WNR.....	B	154
Oxamine Brown GR.....	B	A98	Palatine Chrome Brown	B	154
Oxamine Brown GX.....	B	A99	WNRTX.....	B	154
Oxamine Brown 3 GX....	B	A100	Palatine Chrome Green G...	B	A124
Oxamine Brown R, RG...	B	344	Palatine Chrome Green GX	B	A125
Oxamine Claret B.....	B	A101	Palatine Chrome Red B....	B	202
Oxamine Copper Blue RR...	B	A102	Palatine Chrome Red R....	B	A126
Oxamine Copper Blue RXX	B	A103	Palatine Chrome Violet...	B	156
Oxamine Dark Blue BGN...	B	A105	Palatine Light Yellow R...	B	A127
Oxamine Dark Blue BGE...	B	A104	Palatine Orange R.....	B	A128
Oxamine Dark Blue BRKX	B	A107	Palatine Red A.....	B	109
Oxamine Dark Blue R....	B	A106	Palatine Scarlet A.....	B	81
Oxamine Dark Brown G...	B	A108	Palatine Scarlet G, 3 lt, 4 R	B	81a
Oxamine Dark Brown R...	B	A109	Palatinite.....	B	U173
Oxamine Fast Blue 6 VX...	B	A110	Panama Black 3 G, R....	Sch	436
Oxamine Fast Blue RR...	B	A111	Paper Blue 6 G.....	Sch	537
Oxamine Fast Pink BX...	B	A112	Paper Blue MD.....	M	U450
Oxamine Fast Red F.....	B	343	Paper Blue TRR.....	B	U459
Oxamine Green C.....	B	475	Paper Blue 33598.....	S	U713
Oxamine Green B, BX...	B	474	Paper Blues, green shades	Sch	537
Oxamine Green G, GX...	B	475	Paper Blues, red shades...	Sch	537
Oxamine Light Blue B...	B	A113	Paper Brown BB.....	B	U175
Oxamine Light Blue GX...	B	A114	Paper Brown RL.....	B	U176
Oxamine Light Brown G...	B	A115	Paper Brown RT.....	B	U177
Oxamine Light Brown R...	B	A116	Paper Fast Bordeaux B....	By	U255
Oxamine Light Green B...	B	A117			
Oxamine Light Green G....	B	A118			

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Paper Green D.....	K	U375	Phloxine.....	DH,M	593
Paper Orange CR.....	K	U376	Phloxine B, GA, HM.....	M	596
Paper Orange residue.....	K	U377	Phloxine P.....	B	593
Paper Red O.....	WD	307	Phoenix Brown D.....	A	U58
Paper Scarlet (V.M.).....	K	U378	Phosphine (V. M.).....	Var	606
Paper Yellow.....	Var	303	Phosphine A.....	GrE	606
Paper Yellow.....	WD	303a	Phosphine AR, GG.....	tM	606
Paper Yellow G, GGX,RRX.....	B	303a	Phosphine G.....	S	606
Paper Yellow 3 GX.....	B	303	Phosphine GO.....	K	606
Paper Yellow 3 RXX.....	B	303a	Phosphine LM, O.....	M	606
Para Black B.....	By	A278	Phosphine LB, PHLB.....	GrE	606
Para Blue.....	CG	702	Phosphine 3 R.....	A	606
Para Brilliant Orange G.....	By	A282	Phosphine RS.....	H	606
Para Brown GK.....	By	A279	Phosphine 12901.....	P	606
Para Brown RK.....	By	A280	Picric Acid.....	...	5
Para Brown SC.....	By	A281	Pigment Black.....	B	U180
Para Diamine Black (V.M.).....	C	A388	Pigment Black BP.....	B	U181
Para Green 2 BL.....	By	A283	Pigment Chlorine.....	M	8
Para-Fuchsin.....	Var	511	Pigment Chrome Yellow L.....	M	21
Para Magenta.....	H	511	Pigment Fast Red HL.....	M	73
Para Orange G.....	By	A284	Pigment Fast Yellow G.....	M	28
Para Yellow.....	AW	U588	Pigment Fast Yellow R.....	M	24
Paramine.....	B	U178	Pigment Orange R.....	M	72
Paranitraniline Red.....	Var	56	Pigment Purple A.....	M	93
Paraphenylene Blue R.....	WD	701	Pigment Scarlet G.....	M	201
Paraphenylene Violet.....	WD	695	Pigment Scarlet 3 B.....	M	202
Paraphosphine (V. M.).....	C	U294	Pinachrome.....	M	613a
Para Red.....	Var	56	Pinacyanol.....	M	U466
Paratol Chrome Yellow L.....	M	U460	Pink.....	K	U381
Paratol Fast Yellow G.....	M	U461	Pink B.....	I	U681
Paratol Lake Red KP.....	M	U462	Pink M.....	H	U763
Paratol Lake Red LC.....	M	U463	Pink Color.....	Q	U806
Paratol Lake Red LP.....	M	U464	Pluto Black A.....	By	A286
Paratol Scarlet 3 B, 3 BX.....	M	U465	Pluto Black BS.....	By	A287
Parazole Brown RK.....	K	U379	Pluto Black CF.....	By	A288
Paris Violet.....	P	515	Pluto Black F.....	By	A289
Paris Violet 3 B, 6 B, 3 BA.....	P	515	Pluto Black G.....	By	A290
Paris Violet 4 BA, 4 R, 90.....	P	515	Pluto Black SS.....	By	A291
Patent Alizarin Black DEB, DFF, DFFA.....	M	807a	Pluto Brown GG.....	By	A292
Patent Black (V. M.).....	C	U295	Pluto Brown NB.....	By	A293
Patent Blue.....	...	543	Pluto Brown R.....	By	A294
Patent Blue A.....	Var	545	Pluto Milling Black B.....	By	A295
Patent Blue AE.....	M	545	Pluto Orange G.....	By	392
Patent Blue B.....	A, M	543	Plutoform Black 3 GL.....	By	A296
Patent Blue L, LE, NO.....	M	543	Polar Orange GS.....	G	U633
Patent Blue V.....	Var	543	Polar Red 3 B.....	G	U635
Patent Blue V new.....	M	543	Polar Red G.....	G	U636
Patent Blue J 3, JI, WE.....	M	543a	Polar Red R.....	G	U637
Patent Marine Blue.....	M	543	Polar Red RS.....	G	U638
Patent Marine Blue LER.....	M	543b	Polar Yellow G.....	G	U639
Patent Phosphine G, GG, M, R.....	I	606	Polar Yellow 2 G.....	G	U640
Patent Phosphine 19332.....	I	606c	Polar Yellow R.....	G	U641
Pegu Brown G.....	L	A511	Polar Orange RC.....	G	U634
Peri Wool Blue B.....	C	87	Polychromine AC.....	G	616
Permanent Blue GR.....	CG	U493	Polychromine B.....	G	13
Permanent Orange R.....	A	131	Polyphenyl Black BVC.....	G	A650
Permanent Red.....	A	152	Polyphenyl Black GNC.....	G	A651
Permanent Red B, 2 B, R, 4 R.....	A	152a	Polyphenyl Blue GC.....	G	A652
Permanent Red 4 B.....	A	152	Polyphenyl Blue GF.....	G	A653
Persian Red RD.....	B	U179	Polyphenyl Brilliant Blue 3 G.....	G	A654
Phenamine Blue G.....	B	A129	Polyphenyl Fast Red BC.....	G	A655
Phenanthrene Chrome Blue.....	I	U680	Polyphenyl Orange RC.....	G	A656
Phenochrome Yellow.....	K	U380	Polyphenyl Yellow 3 GC.....	G	A657
Phenocyanine TC, R, VS.....	DH	642	Ponceau (V. M.).....	K	83a
Phenocyanine TV.....	DH	643	Ponceau BO.....	A	227
Phenylamine Black 4 B.....	By	A285	Ponceau G.....	M	39
Phenyl Crimson S.....	CV	A731	Ponceau 4 GB.....	A, etc.	37
Phenylene Black.....	P	267	Ponceau K.....	I	175a
Phenylene Blue.....	BK	649	Ponceau R, 2 R.....	I	82
Philadelphia Yellow 2 G.....	A	606	Ponceau 3 R.....	Var	83
			Ponceau 4 R.....	Var	83
			Ponceau 4 R.....	P	169
			Ponceau 5 R.....	M, K	228

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Ponceau 6 R.....	B, M	170	Pyrogene Green 3 G.....	I	746
Ponceau 3 RB.....	A	247	Pyrogene Indigo.....	I	735
Ponceau 4 RB.....	A	249	Pyrogene Indigo CL, 5 G, GL	I	735
Ponceau 6 RB.....	A	255	Pyrogene Indigo R, RR....	I	735
Ponceau 10 RB.....	A	259	Pyrogene Olive 3 G.....	I	746
Ponceau RL, 2 RL, 3 RL, 2 RLH.....	A	82a	Pyrogene Orange R.....	I	S164
Ponceau 2 RL.....	By	82	Pyrogene Yellow M, O, 3 R	I	734
Ponceau S.....	A	247a	Pyrol Brown G.....	L	S135
Ponceau SPJ.....	P	169b	Pyrol Brown 69181.....	L	S136
Ponceau S 2 R.....	B	82	Pyrol Brown (yellowish)...	L	S135
Ponceau W 3 R.....	P	169b	Pyronine G.....	I, By	568
Ponceau X.....	BK	82b	Pyrophosphine C.....	WD	U547
Ponceau 12402.....	I	175a	Quercitron Substitute V.....	B	U184
Ponceau for Silk.....	P, K	175	Quercitron Substitute WBL	B	U183
Ponceau (free from arsenic)...	WD	82c	Quinoline Blue.....	G	611
Potting Black B.....	I	184	Quinoline Red.....	A	610
Prague Alizarin Yellow G.....	Ki	49	Quinoline Yellow.....	A	612
Primal Black.....	A	U50	Quinoline Yellow.....	AW	613
Primazine Yellow G.....	B	A130	Quinoline Yellow.....	B	612
Primuline.....	Var	616	Quinoline Yellow.....	By	613
Primuline A.....	B, M	616	Quinoline Yellow.....	C	613
Primuline (V. M.).....	Var	616	Quinoline Yellow.....	I	613
Primuline Yellow.....	AW, By	616a	Quinoline Yellow.....	M	613
Printing Black for Wool.....	B	776	Quinoline Yellow.....	S	612
Printing Blue for Wool.....	B	742	Quinoline Yellow KT, N.....	By	613
Printing Yellow (greenish)...	K	U382	Quinoline Yellow O.....	M	613
Prune 516.....	Lev	636	Quinoline Yellow P.....	B	612
Prune pure.....	S	636	Quinoline Yellow 9272.....	I	612
Pure Blue AI.....	I	539	Quinoline Yellow, spirit sol- uble.....	Var	612
Pure Blue DS, DSG.....	H	539	Quinoline Yellow, water sol- uble.....	Var	613
Pure Blue RT.....	BK.	539	Radial Yellow C.....	B	30
Pure Soluble Blue.....	C	539	Rapid Filter Green I.....	M	U467
Pure Yellow DG.....	K	U383	Rapid Filter Red I.....	M	U468
Purpurin (synthetic).....	B	783	Raven Black 34588.....	H	U764
Pyramidol Brown BG.....	FA	317	Red (V. M.).....	CJ	U497
Pyramidol Brown T.....	FA	376	Red PC.....	DH	U600
Pyramine Orange 2 GX.....	B	362a	Red PC.....	G	U642
Pyramine Orange 3 G.....	B	366	Red 2 S.....	P	483a
Pyramine Orange R.....	B	360	Red Blue BSR.....	GrE	U513
Pyramine Orange RR.....	B	314	Red Brown.....	S	106c
Pyramine Orange RT.....	B	362	Red Coraline.....	...	556
Pyramine Yellow GXSC.....	B	304	Red for Leather O.....	M	U469
Pyramine Yellow GXSP.....	B	304	Red for Leather R.....	A	U60
Pyramine Yellow R, RX.....	B	191	Red Lake RL.....	By	U256
Pyrazole Orange G.....	S	392	Red Lake RMT.....	By	U257
Pyrazole Orange R.....	S	A722	Red Violet.....	tM	514
Pyrogallol-cy anine-sulphon- ic acids.....	DH	623	Red Violet 5 R.....	B	514
Pyrogene Black G.....	I	730	Red Violet 5 RS.....	B	525
Pyrogene Blue.....	I, C	726	Reddish Brown.....	K	U384
Pyrogene Blue RR, 2 RN.....	I	726	Renol Black BHN.....	tM	462b
Pyrogene Blue Green B.....	I	746	Renol Black SF, ST.....	tM	462b
Pyrogene Brown D.....	I	S155	Renol Blue B.....	tM	410
Pyrogene Brown G.....	I	S156	Renol Bordeaux.....	tM	A517
Pyrogene Brown GX.....	I	S157	Renol Brilliant Yellow.....	tM	303
Pyrogene Brown OR.....	I	S158	Renol Brown MB, RA.....	tM	344
Pyrogene Brown ORR.....	I	S159	Renol Dark Green NOONG	tM	A518
Pyrogene Brown 4 R.....	I	S160	Renol Fast Red 4 B.....	tM	A519
Pyrogene Cutch DR.....	I	S161	Renol Green B.....	tM	475
Pyrogene Cutch 2 GO.....	I	S162	Renol Light Blue A.....	tM	A520
Pyrogene Cutch 2 R.....	I	S163	Renol Light Blue G.....	G	A558
Pyrogene Dark Green B.....	I	746	Renol Light Blue G.....	tM	A521
Pyrogene Deep Black C, D, G	I	720	Renol Orange 3 AP.....	G, tM	302a
Pyrogene Direct Blue.....	I	726	Renol Red.....	tM	A522
Pyrogene Direct Blue, green shade.....	I	726	Renol Yellow 3 R.....	tM	9
Pyrogene Direct Blue, red shade.....	I	726	Renolamine Black BHN.....	G, tM	333
Pyrogene Direct Blue RL.....	I	726	Resoflavin W.....	B	771
Pyrogene Green G.....	I	746	Resorcin Blue.....	M	647
Pyrogene Green 2 G.....	I	709	Resorcin Brown.....	Var	211
			Resorcin Brown G.....	G	211
			Resorcin Brown QV.....	G	211
			Resorcin Dark Brown.....	BK	213



Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Resorcin Yellow.....	Sch	143	Safranine (V. M.).....	Var	679
Rheonine.....	B	607	Safranine B.....	Var	679
Rheonine AL, GD.....	B	607	Safranine 6 B.....	Sch	680
Rhine Blue.....	Q	631	Safranine FF.....	By	679
Rhodamine AL.....	B	572a	Safranine F.....	K	679
Rhodamine B.....	Var	573	Safranine FB.....	B	679
Rhodamine 3 B.....	I, B	574	Safranine MN.....	B	683
Rhodamine BN.....	Q	573	Safranine O.....	M	679
Rhodamine BSP.....	M	573	Safranine T, TK.....	B	679
Rhodamine G.....	Var	572	Safranine Y.....	Sch	679
Rhodamine 3 G.....	B	576	Safranine Z.....		679
Rhodamine 5 G.....	By	576a	Safranine 1081.....	K	679
Rhodamine 5 G.....	S	572a	Safranine bluish.....	K	680
Rhodamine 6 G.....	Var	571	Safranine (blue shade).....	L	679
Rhodamine 12 GF.....	I	578	St. Denis Black B.....	P	718
Rhodamine 6 GN.....	B	571	St. Denis Red.....	P	483
Rhodamine S.....	B, By	570	Salicine Black (V. M.).....	K	181b
Rhodamine S.....	I	570	Salicine Black K, LR, S.....	K	181b
Rhodamine SP.....	B	570	Salicine Black U, UL.....	K	181
Rhodamine R.....	I	572a	Salicine Blue B.....	K	A403
Rhodamine 6302.....	Q	572a	Salicine Bordeaux R.....	K	A404
Rhodamine Scarlet G.....	By	576b	Salicine Brown (V. M.).....	K	A405
Rhodine 2 G.....	I	577	Salicine Dark Green CS.....	K	276
Rhodine 12 GM.....	I	575	Salicine Green CP.....	K	A407
Rhoduline Blue 6 G.....	By	U258	Salicine Orange 2 R.....	K	A408
Rhoduline Heliotrope 3 B.....	By	U259	Salicine Orange 2541, 2542.....	K	A409
Rhoduline Orange N, NO.....	By	603a	Salicine Red B.....	K	A410
Rhoduline Red B, G.....	By	684	Salicine Red G.....	K	A411
Rhoduline Violet.....	By	684	Salicine Violet R.....	K	A412
Rhoduline Yellow 6 G.....	By	618a	Salicine Yellow (V. M.).....	K	177b
Roccelline.....	C, FA	161	Salmon Red.....	C	120
Roccelline FS.....	H	161	Scarlet.....	CDCO	174
Roccelline MB.....	tM	161	Scarlet (V. M.).....	C	247
Roccelline S.....	G, tM	161	Scarlet AB.....	GrE	A475
Rosanthere A WL.....	I	A704	Scarlet 6 B.....	GrE	A476
Rosanthere B.....	I	A705	Scarlet BN.....	B	A131
Rosanthere CB.....	I	A706	Scarlet C.....	Q	196a
Rosanthere R.....	I	A707	Scarlet EC.....	C	247
Rosanthere Bordeaux B.....	I	A708	Scarlet GA.....	M	A132
Rosanthere Orange 16754.....	I	A709	Scarlet GRCL, M.....	B	174a
Rosanthere Violet SR.....	I	A710	Scarlet GX.....	K	U385
Rosazeine B.....	M	573	Scarlet 15 N.....	B	A133
Rosazeine B 5.....	M	U471	Scarlet P.....	K	U385
Rosazeine 6 G.....	M	U472	Scarlet PO, 2 PR.....	K	U385
Rosazurine B.....	A, By	372	Scarlet R, 2 R.....	M	174a
Rosazurine G.....	A, By	371	Scarlet R, 2 R.....	Var	82
Rose (V. M.).....	CJ	U498	Scarlet 2 R.....	K	U385
Rose Bengal.....	Var	595	Scarlet 2 R.....	tM	176
Rose Bengal.....	G, M	597	Scarlet 3 R, 6 R, 2 RCL, 3 RCL.....	M	174a
Rose Bengal B.....	B, L	597	Scarlet 3 R.....	B	83
Rose Bengal B.....	K, M	597	Scarlet 4 R.....	Q	83
Rose Bengal N.....	C	595	Scarlet 4 R.....	P, tM	176a
Rose Bengal NTO.....	B	595	Scarlet 6 R crystals.....	BK	223b
Rose Magdala.....	DH	694	Scarlet RD.....	H	82d
Roseine B.....	S	512	Scarlet 4 RI, 2 RII.....	AW	106b
Rosinduline.....	K	674	Scarlet 4 R.....	M	174a
Rosinduline 2 B.....	K	673	Scarlet S 2 R.....	B	A134
Rosinduline G.....	K	675	Scarlet S 3 R.....	B	A135
Rosinduline 2 G.....	K	674	Scarlet 2 SRM.....	B	A136
Rosolane.....	P	688	Scarlet X, XX.....	K	U385
Rosolane B, O.....	M	687	Scarlet 50.....	H	169
Rosolane O, T, R.....	M	687	Scarlet 231, 243.....	CJ	76a
Rosophenine 4 B.....	ClCo	483	Scarlet 1610.....	K	U385
Rosophenine 10 B.....	ClCo	194	Scarlet 7214.....	B	A137
Rosophenine SG.....	ClCo	195	Scarlet 53446.....	A	U61
Rubine.....	A	512	Scarlet (yellow shade) 17413.....	B	A138
Rubine N.....	A	512	Scarlet (yellow shade) 24211.....	B	A139
Rubine N.....	B	U189	Scarlet for silk S.....	P	247c
Rubramine.....	CG	703	Scarlet residue.....	K	U385
Russian Leather Red R.....	A	512	Seal Brown W.....	P	U594
Russian Red.....	C	512	Sella Brilliant Yellow P.....	G	U643
Saba Phosphine G, CG.....	S	606	Sella Flavine G.....	G	U644
Safranine.....	Var	679			

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Sepia Black FW, 14998....	I	U682	Spirit Black (V. M.).....	CJ	U499
Serge Blue.....	A	539	Spirit Blue.....	Var	521
Setocyanine O.....	G	500	Spirit Blue BVE.....	P	521
Setoglaucine O.....	G	496	Spirit Blue R.....	M	521
Setopaline.....	G	500	Spirit Blue, green shades.....	Sch	521
Silk Blue.....	tM	539a	Spirit Blue, red shades.....	Sch	521
Silk Blue B.....	B	537	Spirit Nigrosine.....	WD	698
Silk Blue B.....	BK	559	Spirit Nigrosine LM, P.....	H	698
Silk Blue B.....	Q	539	Spirit Yellow.....	L, tM	31
Silk Blue BJBNOO.....	GrE	539a	Spirit Yellow R.....	K	68
Silk Blue BS3BB, BT5BOO			Stanley Red.....	CICo	193
BTR.....	GrE	539a	Steam Green G.....	B	U191
Silk Blue BTB, BTR.....	GrE	539a	Stilbene Yellow.....	Var	10
Silk Blue 4 R.....	Q	539	Stilbene Yellow 3 G.....	CICo	10
Silk Blue 4.....	By	537	Stilbene Yellow 3 G.....	CR	10
Silk Blue 5770.....	BK	559	Stilbene Yellow 2 GP,		
Silk Gray CB, 281.....	K	U386	3 GPX, GX.....	B	10
Silk Wool Black 3 B.....	M	U473	Stilbene Yellow RX.....	B	10a
Silk Yellow N.....	BK	613	Stilbene Yellow 5912.....	B	10b
Silk Yellow N.....	Q	U811	Straw Blue G.....	By	U260
Silver Gray N.....	C	700	Sudan G, 2 G.....	A	35
Silver Gray P.....	A	700	Sudan R.....	A	93
Sirius Yellow G.....	B	758	Sudan I.....	A	36
Sitara Fast Red RL.....	tM	56	Sudan II.....	A	76
Sitara Orange I.....	tM	A523	Sudan III.....	A, etc.	223
Sky Blue FFO.....	S	424	Sudan IV.....	A, etc.	232
Solamine Blue B.....	A	A44	Sudan Brown.....	A	105
Solamine Red.....	A	A44a	Sudan Brown S.....	Sch	105
Solfigene Blue Green B.....	I	U684	Sulfamine Brown A.....	WD	107
Solfigene Blue Green 16444.....	I	U683	Sulfamine Brown B.....	WD	116
Solfigene Cutch.....	I	U685	Sulfaniline Brown O, R.....	IC	708
Solfigene Cyanine.....	I	U686	Sulfine Blue B.....	CG	S125
Solfigene Deep Black (V.M.).....	I	U688	Sulfine Blue RR.....	CG	S126
Solfigene Deep Black 14717.....	I	U687	Sulfine Brown.....	..	707
Solfigene Green GG.....	I	U689	Sulfine Brown.....	CG	737
Solid Blue (V. M.).....	C	U296	Sulfine Brown B, G.....	CG	737
Solid Blue 3 R.....	S	699	Sulfo Blacks B, 2 B.....	H	744
Solid Blue RX.....	Q	699	Sulfo Green B, C.....	NF	U550
Solid Blue SBAOOOO.....	GrE	699	Sulfo Rhodamine B.....	M	579
Solid Blue SBSOOO.....	GrE	699	Sulfo Rosazaine B.....	M	U475
Solid Blue Base SBXBX.....	GrE	699	Sulfo Rosazaine G.....	M	U476
Solid Brown.....	Q	U812	Sulfogene Brown G, D.....	I	757
Solid Brown KF.....	Q	U813	Sulfoline G.....	AW	U589
Solid Brown O.....	M	U474	Sulfoline G.....	K	U387
Solid Green (V. M.).....	C	495	Sulfoline R.....	AW	U590
Solid Green 3 G.....	Q	499	Sulfon Acid Black N 2 B.....	By	U261
Solid Green O.....	M	1	Sulfon Acid Blue B.....	By	189
Solid Red B.....	Q	U814	Sulfon Acid Blue R.....	By	188
Solid Yellow G.....	Q	137	Sulfon Acid Green B.....	By	U262
Soluble Blue.....	ByCo	537	Sulfon Black 3 B.....	By	256
Soluble Blue.....	Var	539	Sulfon Black G.....	By	242
Soluble Blue.....	H&M	537	Sulfon Blue R.....	By	188
Soluble Blue (V. M.).....	Var	539	Sulfon Orange G, 5 G.....	By	A297
Soluble Blue AOOOO.....	GrE	539	Sulfon Violet R.....	By	A298
Soluble Blue B, BCBIL.....	CG	539	Sulfon Yellow 5 G, R.....	By	A299
Soluble Blue BLSE, 3 BS.....	P	539	Sulfonazurine.....	By	361
Soluble Blue BS 3B B, BSJ.....	GrE	539	Sulfoncyanine.....	Var	257
Soluble Blue C 2, C 3, C 5,			Sulfoncyanine BB, GR, 5 R,		
CX.....	K	539	SR.....	B	257a
Soluble Blue ELOOO.....	GrE	539	Sulfoncyanine G, GR, 5 R,		
Soluble Blue HA, IN, 4 R,			5 RT.....	By	257
TB, TL.....	B	539	Sulfoncyanine Black B, 2 B	By	265
Soluble Blue 5 R.....	tM	539	Sulfoncyanine Black BB,		
Soluble Blue RM.....	M	539	GR.....	B	265a
Soluble Blue base SBXR.....	GrE	539	Sulfur Black.....	Var	720
Soluble Blue crystals.....	tM	539	Sulfur Black.....	WD	721
Soluble Blue (greenestshade)	tM	539	Sulfur Black.....	A	720
Soluble Navy Blue.....	G	539o	Sulfur Black A, AW, AWL.....	A	720
Sorbin Red.....	B	64	Sulfur Black B, 2 B, 4 B.....	A	720
Sorbin Red X.....	B	64	Sulfur Black 2 B, BR, BRH,		
Special Blue G.....	B	U190	GF.....	K	720
Special Phosphine G.....	S	006	Sulfur Black FAG, FT.....	A	720
Spirit Black.....	G	U645	Sulfur Black H, JBL.....	A	720

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Sulfur Black KCB, MA....	K	720	Tannin Heliotrope.....	C	685
Sulfur Black T, TFA, TG..	A	720	Tannin Orange R.....	C	74
Sulfur Black TR.....	Lev	720	Tannin Orange R.....	S	006
Sulfur Black TS, 5274, 5276	K	720	Tartrazine.....	Var	23
Sulfur Black 5285, 5289....	K	720	Tartrazine G, X, XX....	B	23
Sulfur Black 108583.....	A	720	Terra Cotta FC.....	G	209
Sulfur Black Brown N.....	A	S1	Terra Cotta 2 RN, RGN...	G	58
Sulfur Black Brown NR....	A	S2	Tetracyanol A.....	C	545
Sulfur Blue B.....	A	S3	Tetracyanol SFV.....	C	543
Sulfur Blue BE.....	BK	S123	Thiazine Blue.....	G	A659
Sulfur Blue BG, CHL.....	K	S83	Thiazine Brown R.....	B	U192
Sulfur Blue D.....	A	S4	Thiazine Red G.....	B	197
Sulfur Blue G.....	K	S83	Thiazine Red R.....	B	194
Sulfur Blue L.....	A	S6	Thiazine Yellow G, 3 G, GL	By	198
Sulfur Blue PR.....	A	S7	Thiazol Yellow G.....	By	198
Sulfur Blue R.....	A	S8	Thiazol Yellow GR.....	BD	198
Sulfur Blue 2 R.....	A	S9	Thiazol Yellow R, RH....	By	51
Sulfur Blue 4 R.....	A	S10	Thiocarbonyl NNG.....	C	720
Sulfur Blue RR.....	BK	S124	Thiocarbonyl R.....	C	662
Sulfur Blue U.....	K	S83	Thio Catechine.....	P	715
Sulfur Brilliant Green GK..	A	S11	Thio Cotton Black.....	WD	721
Sulfur Bronze 136.....	Lev	S168	Thioflavine (V. M.).....	C	618
Sulfur Bronze 158.....	Lev	S169	Thioflavine OIO.....	K	615
Sulfur Brown CL 4 R.....	A	S12	Thioflavine S.....	S, C	615
Sulfur Brown G.....	A	S13	Thioflavine T.....	C	618
Sulfur Brown 2 G.....	A	S14	Thioflavine 654.....	K	615
Sulfur Brown 6 G.....	A	S15	Thiogene Black BB, 5 B..	M	720
Sulfur Brown M.....	I	S165	Thiogene Black M, MA,		
Sulfur Brown O.....	A	S16	MM.....	M	720
Sulfur Brown OB.....	A	S17	Thiogene Black ML, MZ...	M	720
Sulfur Brown 527.....	Lev	S170	Thiogene Blue RL.....	M	S99
Sulfur Brown 731.....	Lev	S171	Thiogene Blue R.....	M	S97
Sulfur Brown (bluish).....	K	S84	Thiogene Blue 2 R.....	M	S98
Sulfur Brown (reddish)....	K	S84	Thiogene Cyanine B.....	M	S107
Sulfur Catechu G.....	A	S18	Thiogene Cyanine G.....	M	S108
Sulfur Catechu R.....	A	S19	Thiogene Dark Red G....	M	S109
Sulfur Corinith B.....	A	S20	Thiogene Deep Blue BR...	M	S111
Sulfur Corinith CLB.....	A	S21	Thiogene Deep Blue.....	M	S110
Sulfur Green 2 BK.....	A	S22	Thiogene Green BL.....	M	S112
Sulfur Green 4 BK.....	A	S23	Thiogene Green G.....	M	S113
Sulfur Green G.....	A	S24	Thiogene Green GG.....	M	S114
Sulfur Green 4 GK.....	A	S25	Thiogene Green GL.....	M	S115
Sulfur Green 309.....	Lev	S172	Thiogene Khaki N.....	M	S116
Sulfur Green 330.....	Lev	S173	Thiogene New Blue JL....	M	S117
Sulfur Indigo BA.....	A	S26	Thiogene Olive Green GGN	M	S118
Sulfur Indigo CL.....	A	S28	Thiogene Orange R.....	M	S119
Sulfur Indigo CLGG.....	A	S29	Thiogene Violet V.....	M	S120
Sulfur Indigo Blue RCL....	K	S85	Thiogene Yellow GG.....	M	S121
Sulfur Indigo Blue 827....	K	S85	Thiogene Yellow 5 G.....	M	S122
Sulfur Olive.....	S	S167	Thiogene Brown G.....	M	S100
Sulfur Olive B.....	A	S30	Thiogene Brown GG.....	M	S102
Sulfur Red Brown 2 RK....	A	S31	Thiogene Brown GC.....	M	S101
Sulfur Red Brown 6 RK....	A	S32	Thiogene Brown GR.....	M	S103
Sulfur Violet R.....	A	S33	Thiogene Brown G 2 R....	M	S104
Sulfur Violet Y.....	A	S34	Thiogene Brown R.....	M	S105
Sulfur Yellow ES.....	K	U388	Thiogene Brown S.....	M	S106
Sulfur Yellow G.....	S	712	Thio Indigo Brown G.....	K	904
Sulfur Yellow G.....	A	S35	Thio Indigo Brown 2 R....	K	902
Sulfur Yellow G.....	K	U388	Thio Indigo Orange R....	K	913
Sulfur Yellow 4 G.....	A	S36	Thio Indigo Pink 247, 2475	K	910
Sulfur Yellow I.....	A	S37	Thio Indigo Pink Rose BW.	K	910
Sulfur Yellow R.....	A	S38	Thio Indigo Red B.....	K	912
Sulfur Yellow R.....	I	S166	Thio Indigo Red 3 B.....	K	918
Sultan 5 B.....	H	363	Thio Indigo Rose AN, BN..	K	910
Sultan 10 B.....	H	405	Thio Indigo Scarlet R....	K	906
Sultan Orange DS.....	H	304d	Thio Indigo Scarlet S, 6086	K	905
Sultan Yellow H.....	H	304	Thio Indigo Violet 2 B....	K	916
Sun Yellow.....	Var	9	Thio Indigo Violet K.....	I, K	920
Sun Yellow G, GS, RR....	S	9	Thio Indigo Violet K.....	K	900
Sun Yellow 3 GC.....	G	9	Thio Indigo Yellow 3 GN..	K	913a
Supramine Brown R.....	By	U263	Thional Black G.....	S	719
Supramine Yellow R.....	By	U264	Thional Brilliant Green 29	S	746
Tabora Black X.....	A	A45	Thional Brown.....	S	747

Name	Manu- fac- turer	Serial No.	Name	Manu- fac- turer	Serial No.
Thional Brown G.....	S	747	Tolyl Blue ST, 7656.....	M	257b
Thional Dark Green GN.....	S	746	Tonka Brown GS.....	I	U691
Thional Green.....	S	746	Triazol Blue B.....	GrE	A478
Thional Green GG.....	S	746	Triazol Blue BOO.....	GrE	A479
Thional Red Brown.....	S	747	Triazol Blue BBOO.....	GrE	A480
Thion Black (V. M.).....	K	720	Triazol Blue 4 BOO.....	GrE	A481
Thion Blue B.....	K	736	Triazol Blue R.....	GrE	A482
Thion Brown (V. M.).....	K	S86	Triazol Blue 3242.....	GrE	A483
Thion Dark Blue BO.....	K	S87	Triazol Bordeaux B.....	GrE	A484
Thion Direct Blue.....	K	736a	Triazol Brown GOOA.....	GrE	A485
Thionine Blue GO.....	A, M	661	Triazol Brown GOOO.....	GrE	A486
Thionine Blue OO, 3 O.....	A	661	Triazol Brown HRO.....	GrE	A487
Thion Green 2 G.....	K	S88	Triazol Brown SOOO.....	GrE	A488
Thion Green 829.....	K	S89	Triazol Dark Blue BHOOO	GrE	A490
Thion Navy Blue (V. M.).....	K	S90	Triazol Dark Blue		
Thionol Black.....	Lev	719	BHPOOOO.....	GrE	A491
Thionol Black S, XX.....	Lev	720	Triazol Dark Blue BHTOOO	GrE	A492
Thionol Yellow GR.....	Lev	198	Triazol Dark Blue BOO.....	GrE	A489
Thion Orange (V. M.).....	K	S91	Triazol Dark Blue 3 G.....	GrE	A493
Thion Purple O.....	K	S92	Triazol Dark Blue ROO.....	GrE	A494
Thion Violet.....	K	S93	Triazol Fast Red L.....	GrE	343
Thion Violet Black.....	K	720	Triazol Fast Yellow 2		
Thion Yellow (V. M.).....	K	S96	GOOOO.....	GrE	617
Thion Yellow 2 G.....	K	S94	Triazol Green B.....	GrE	474
Thion Yellow 5 G.....	K	S95	Triazol Green BPOO.....	GrE	A495
Thiophenol Black T.....	I	720	Triazol Green GPOO.....	GrE	A496
Thiophor Black WLN.....	CJ	720	Triazol Pure Blue 3 B.....	GrE	A497
Thiophor Blue B.....	CJ	S127	Triazol Pure Blue R.....	GrE	A498
Thiophor Bronze 5 G.....	CJ	713	Triazol Red B.....	GrE	319
Thiophor Dark Brown B.....	CJ	S128	Triazol Violet R.....	GrE	A499
Thiophor Deep Green CG.....	CJ	S129	Triazol Violet RR.....	GrE	A500
Thiophor Indigo CJ.....	CJ	731	Triazol Yellow NBPOO.....	GrE	304
Thiophor Khaki.....	CJ	S130	Trisulfon Blue B.....	S	409
Thiophor Orange O.....	CJ	S131	Trisulfon Blue 3 G.....	S	400a
Thiophor Yellow R.....	CJ	S132	Trisulfon Blue R.....	S	378
Thiophor Yellow Bronze G.....	CJ	714	Trisulfon Brown.....	SS	449
Thiophor Yellow Olive.....	CJ	S132a	Trisulfon Brown A, B, MB.	S	449
Thio Vesuvine BB.....	Q	U815	Trisulfon Brown G.....	S	454
Thioxine Black AB0000.....	GrE	720	Trisulfon Brown GG.....	S	457
Thioxine Black ABBOOOO.....	GrE	720	Trisulfon Violet B.....	S	322
Thioxine Black 3 BOOO.....	GrE	720	Tropaeoline (V. M.).....	C, etc.	143
Thioxine Black GB, 1151,			Tropaeoline OO.....	H	139
3705.....	GrE	720	Trypan Blue.....	M	391
Thioxine Brown 5 G.....	GrE	S133	Trypan Red.....	M	359
Thioxine Brown 2 GR.....	GrE	S134	Turmeric Yellow OOO.....	I	U692
Titan Como 2 B.....	H	A761	Turquoise Blue.....	Q	498
Titan Como R.....	H	A762	Turquoise Blue B, BB, G.....	By	498
Titan Fast Black B.....	H	A763	Tuscaline Orange G.....	R	90
Titan Orange.....	H	A764	Typophor Black FB.....	B	U193
Titan Red.....	H	196	Typophor Brown FR.....	B	U195
Titan Scarlet Y.....	H	196	Typophor Black F 3 R.....	B	U194
Titan Yellow G, Y.....	H, BD	198	Typophor Brown FB.....	B	U196
Tolamine Violet.....	I	U690	Typophor Red FG.....	B	U197
Tolane Red B, G.....	K	43	Typophor Yellow FR.....	B	U198
Toluidine Blue.....	B, M	659a	Typophor Yellow F 3 R.....	B	U199
Toluylene Black GOO.....	GrE	A477	Ultra Flavine SD.....	S	U714
Toluylene Brown G.....	GrE	285	Ultra Orange R.....	S	58
Toluylene Brown R.....	GrE	488	Ultra Violet B.....	S	632a
Toluylene Fast Brown 2 R.....	By	U260	Ultra Violet FKN.....	K	632a
Toluylene-Fast Brown 3 G.....	By	U265	Ultra Violet LGP.....	S	632
Toluylene Fast Orange GL.....	By	302d	Ultra Violet MO.....	S	635
Toluylene Orange.....	Var	392	Ultra Violet 943.....	K	632a
Toluylene Orange G.....	Var	392	Ultracyanine B.....	S	644
Toluylene Orange GOO.....	GrE,S	392	Union Acid Black BH, GH.....	H	402e
Toluylene Orange R.....	M	287	Union Black.....	C	462d
Toluylene Orange RR.....	GrE	287	Union Black BRN.....	S	462d
Toluylene Red OO, RT.....	GrE	358	Union Black SOJ.....	A	462d
Toluylene Yellow.....	GrE	286	Union Blue H.....	S	126a
Toluylene Yellow OO.....	GrE	286	Union Blue R.....	M	126
Tolyl Black B, BB, BG.....	M	265	Union Blue R.....	K	126a
Tolyl Blue 5 R.....	M	257	Union Blue (V. M.).....	C	126a
Tolyl Blue SB.....	M	189	Union Fast Claret.....	Lev	238
Tolyl Blue SR.....	M	188	Union Red B.....	K	A412a

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Union Red BS.....	K	A412b	Water Blue S 2 K.....	A	539
Universal Black B.....	By	U267	Wood Red 40 F.....	Sch	168
Urania Blue.....	WD	665	Wool Black (V. M.).....	K	U390
Uranine.....	A, etc.	585	Wool Black (V. M.).....	Lev	220b
Uranine A.....	B	585	Wool Black (V. M.).....	Q	220b
Uranine N.....	M	585	Wool Black 6 A, 6 AN.....	tM	217g
Ursol.....	...	923	Wool Black B, 2 B.....	A	220b
Ursol A.....	A	923	Wool Black B.....	K	U390
Ursol ADF.....	A	923	Wool Black BB.....	AW	272c
Ursol D.....	A	923	Wool Black 3 B.....	Lev	220b
Ursol DB.....	A	923	Wool Black 4 B, 6 B, 4 BC.....	A	220
Ursol DF.....	A	923	Wool Black 4 B.....	I	272c
Ursol GG.....	A	923	Wool Black 10 B.....	tM	217g
Ursol P.....	A	923	Wool Black 4 BFL, 6 BS, 4 BX.....	A	220
Ursol PP.....	A	923	Wool Black CD, CL.....	K	U390
Ursol Gray AL.....	A	923	Wool Black DW.....	BK	269
Varnish Black.....	WD	U548	Wool Black G, GR, GRF.....	A	220b
Varnish Black 5 R.....	Q	U816	Wool Black 6 G.....	G	U646
Vesuvine (V. M.).....	B	284	Wool Black GG.....	tM	217
Victoria.....	G	169	Wool Black HN.....	tM	217g
Victoria Black B.....	By	262	Wool Black LR.....	K	U390
Victoria Blue B.....	Var	559	Wool Black MX.....	Q	220b
Victoria Blue B base.....	Var	559	Wool Black N.....	M	A441
Victoria Blue BE, BS, BSS.....	B	559	Wool Black NN.....	I	272c
Victoria Blue R.....	Var	558	Wool Black N 4 B.....	By	A301
Victoria Blue 4 R.....	Var	522	Wool Black NP.....	K	U390
Victoria Blue Base.....	S	559a	Wool Black NC.....	By	A302
Victoria Blue Base 61272.....	H	559a	Wool Black NP.....	CG	272c
Victoria Brilliant Blue B.....	M	559b	Wool Black NR.....	K	U390
Victoria Fast Violet B.....	By	U268	Wool Black SG.....	GrE	272c
Victoria Fast Violet 2 R.....	By	U269	Wool Black V.....	K	U390
Victoria Green.....	Var	497a	Wool Black 9904.....	BK	269
Victoria Green BF.....	B	497a	Wool Black (greenish).....	K	U390
Victoria Green 4833, 4834.....	By	497a	Wool Blue.....	C	U300
Victoria Green Base.....	B, tM	497a	Wool Blue.....	Q	538b
Victoria Navy Blue L.....	By	U270	Wool Blue (V. M.).....	K	U391
Victoria Pure Blue B.....	B	559	Wool Blue (V. M.).....	Lev	565a
Victoria Scarlet R.....	M	A439	Wool Blue B.....	AW	565
Victoria Scarlet 2 R, 4 R.....	tM	169	Wool Blue 2 B, 5 B, G.....	A	565
Victoria Scarlet 3 R.....	M	A440	Wool Blue 2 BX.....	A	565a
Victoria Violet (V. M.).....	Var	61	Wool Blue G, 2 G, G 446 N.....	K	U391
Victoria Yellow.....	M	134	Wool Blue M.....	AW	562b
Vidal Black I.....	P	717	Wool Blue N.....	By	562
Vigoureux Brown I.....	M	U477	Wool Blue R, RX.....	A	565a
Vigoureux Fast Black T.....	M	159a	Wool Blue R.....	By	562b
Vigoureux Green B.....	C	U299	Wool Blue 5 R.....	H	538
Violamine B.....	M	580	Wool Blue S.....	K	U391
Violamine 3 B.....	M	584	Wool Blue S.....	Q	538b
Violamine R.....	M	582	Wool Blue 2 S.....	K	U391
Violet 2 B.....	K, tM	516a	Wool Blue SB.....	AW	562b
Violet 6 B.....	Q	517	Wool Blue SDOO, SLOO.....	B	530d
Violet DV.....	Q	516a	Wool Blue SR.....	By	562
Violet NX.....	AW	516a	Wool Blue TB.....	K	U391
Violet 9 O, 300 XE.....	P	516a	Wool Blue 1092.....	A	565a
Violet 55396.....	H	516a	Wool Blue Black 2019.....	K	U392
Violet Base 2 B.....	Q	516a	Wool Brown MC, P, SVR, UB, 2808.....	K	U393
Violet Base 5747.....	BK	516a	Wool Canary OD.....	H	U765
Violet Black.....	B	290	Wool Cerise SR.....	K	U394
Violet Crystals.....	S	516	Wool Claret 21 B.....	Lev	U742
Violet Crystals.....	K	516	Wool Claret Red 87 B, 211, 357.....	Lev	U743
Violet Crystals 5 BO, 6 BO.....	I	516	Wool Fast Black B.....	B	U200
Violet Crystals O.....	M	516	Wool Fast Blue BL.....	B	U201
Violet Crystals 142 S.....	K	516	Wool Fast Blue BL.....	By	U271
Violet Direct VR.....	G	A660	Wool Fast Blue GL.....	By	U272
Violet Modern N.....	DH	624	Wool Fast Blue L.....	I	U693
Violet Neutral O.....	M	516a	Wool Fast Orange G.....	B	U202
Violettine 3 R.....	AW	U591	Wool Fast Yellow G.....	B	U203
Viridanthrene B.....	B	705	Wool Fast Yellow 5 GX.....	B	U204
Vitoline Yellow 5 G, R.....	tM	606	Wool Fast Yellow WG.....	B	U205
Vulcan Blue BO.....	Lev	U740	Wool Green (V. M.).....	K	U395
Vulcan Blue G.....	Lev	U741			
Water Blue.....	C, etc.	539			
Water Blue MX.....	Q	539			

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reen B.....	Q	566	Xylene Light Yellow R....	S	22
reen BS.....	By.BK	566	Xylene Red B.....	S	579
reen S.....	Var	566	Xylene Yellow.....	...	22
reen SAK, 16437...	I	566a	Xylene Yellow 3 G.....	K	22
reen SC.....	G	566	Xylidine Orange RR.....	BK,tM	79
t Black 3 B.....	A	220e	Xylidine Scarlet.....	Sch	82
ed.....	K	168b	Yellow (V. M.).....	CJ	U500
ed (V. M.).....	C	236	Yellow (V. M.).....	I	141d
ed C.....	S	236b	Yellow CP.....	Lev	142a
ed CS.....	K	168b	Yellow FY.....	II	U773
ed G.....	B	A140	Yellow NF.....	BK	U487
ed K 10 BX.....	B	A141	Yellow NF.....	Q	U817
ed L, MC, SOC.....	K	168b	Yellow PC.....	DII	U601
ed SB.....	CG	64	Yellow R.....	W	141d
ed 7742.....	BK	168b	Yellow 2 S.....	P	137
arlet.....	K	U396	Yellow (for feathers).....	WD	U549
arlet (V. M.).....	Lev	80b	Yellow Black M.....	BK	U488
arlet 5 B.....	H	80c	Yellow Fast-To-Soap.....	P	203
arlet R.....	Sch	80	Yellow Fat Color.....	B	68
arlet RR.....	B	A142	Yellow Green 6 B.....	BK	U489
arlet 4 R.....	BK	80a	Zambesi Black B.....	A	A46
arlet 3 RB.....	B	A143	Zambesi Black 2 BA.....	A	A47
olet B.....	Q	59a	Zambesi Black BH.....	A	A48
olet R.....	K	U397	Zambesi Black BR.....	A	A49
olet S.....	B	59	Zambesi Black OTA.....	A	A53
olet SL.....	K	U398	Zambesi Black D.....	A	A50
low.....	Sch	23	Zambesi Black F.....	A	A51
low AT, D, G.....	K	U399	Zambesi Black OBA.....	A	A54
low LDV, R.....	K	U399	Zambesi Black R.....	A	A52
low S.....	G	143	Zambesi Black V.....	A	A55
low T.....	G	23	Zambesi Black VM.....	A	A56
low 1501.....	K	U399	Zambesi Bordeaux 7 B.....	A	A57
e CJB.....	I	606	Zambesi Brown.....	...	330
e I.....	P	606	Zambesi Brown G, 2 G.....	A	330
Eosine5 B.....	H	590a	Zambesi Brown 4 R.....	A	330a
.....	H	U770	Zambesi Pure Blue 4 B.....	A	274b
GR.....	H	U770	Zambesi Red B.....	A	A58
yn RH.....	H	284a	Zambesi Red 4 B.....	A	A59
n Y.....	H	U771	Zambesi Red 6 B.....	A	A60
oon.....	H	U772	Zambesi Red 8 B.....	A	A61
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ast Green B.....	S	564	Zambesi Scarlet 2 BL.....	A	A64
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